

# COMPUTERWORLD

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Manufacturing systems: the next step follows in Depth



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## TOP OF THE NEWS

A system that planners hope will ease the burdening of dirty cash by tracking large cash deposits and international wire transfers is under study — and under attack. Page 3.

If you play the stock market, you have two new options. IBM and Merrill Lynch Pierce Fennar & Smith, Inc. announced they will provide a microcomputer-based service offering an array of investment data and services; and Fidelity Brokerage Services, Inc., a leading discount broker, today started a service that enables micro users to trade securities. Page 4.

A terrorist group claimed responsibility for a blast last week that heavily damaged an office building leased by IBM. Page 4.

One in-house data center — to go. Howard Johnson Co. made the move in-

houses from a time-sharing service in only .15 hours. Pages 6-7.

If you have an adversarial relationship with your office automation vendor, you're inhibiting CA innovation and hurting the economy. Marc Labovitz, IBM Inc. President John F. Cunningham told the Federal Office Systems Expo last week. Page 11.

A trio of design systems was introduced recently by Gould, Inc. Page 76.

Compatibility is not enough. Large companies shopping for microcomputers are showing by their buying habits that they want the IBM logo. Page 88.

A harsh assessment of the Amdahl-Fujitsu relationship was delivered by IBM President John F. Alaris at a briefing for stock analysts. Page 97.

## IBM replaces aging 3420 tape drive with subsystem for MVS sites only

By John Hinesman  
CIV Washington Bureau

RYE BROOK, New York — IBM last week announced the long-awaited successor to its 3420 tape drive. The new IBM 3490, which replaces the standard 10.5-in. tape reels with 200M-bytes tape cartridges, features a data buffering controller and more than double the read/write speeds of the aging 3420 units.

IBM said the new tape subsystem attaches to the 20 series, and the 4341 and 4381 processors using the MVS/XA and MVS/370 operating systems. A new Data Facility Hierarchical Storage Manager, Version 2, allows data management in the

3490 plus the 3420, IBM disk drives and mass storage devices in those operating systems, the company added.

IBM said the 3490 offers a nominal data transfer rate of 3M bytes/sec, compared to the 1.5M bytes/sec of the 3420 Model B. The recording medium is an 18-track, 1/2-in. chromium dioxide tape with a 36,000 bytes/in. density housed in a 4- by 8-in. cartridge. The drives use thin-film recording heads and replace the vacuum columns with reel-to-reel servo control technology.

The drive units themselves consume only about half the space of a 3420 and require 60% less power and cooling capacity.

See TAPE page 5

## FVI

## He reached out and touched no one

By John Hinesman  
CIV Staff

BOSTON — Try as he might, a customer of AT&T Communications recently found that communicating with his long-distance communications company was like trying to reach out and touch someone in a game of blindman's bluff.

G. L. Clarke, a lecturer at Boston University's School of Management and Facilities director for a local company here, said that when he called his Boston-based account representative to place an order for a \$5,000 bit/sec Dataphone Digital Service circuit, he was told that his account had been shifted to New York.

New York representatives told him his account was held in Boston.

Stonewalled, Clarke called directory assistance for help. There was no one home at the number given to him.

He called back directory assistance, which gave him another number. The people at the second number were apparently at the same office kiosk as the operators at the first location.

A third number called up a modem answer-back tone.

Computersworld gave it a try. The first and second numbers provided by directory assistance were never answered, and the third induced the high-pitched mating call of a lonely modem.

In desperation, Clarke called on a few friends at New England Telephone Co. They gave him a local, unlisted AT&T Communications number that was answered by a man who was able to help him.

The first thing Clarke learned was that to merit a personal AT&T Communications systems consultant in the dist-

## IBM unwraps low-end model of top 8100

By Tom Ichniowski  
CIV Staff

RYE BROOK, N.Y. — IBM last week announced the 8160 Model A, an entry-level model of its 8100, the top-of-the-line 8100 distributed processing system. In addition, the company doubled the disk storage capacity on the entire 8100 line by unveiling a double-density version of its 8101 disk drive.

At the same time, IBM announced a board-level device that allows users to attach IBM Personal Computer and Personal Computer XT microcomputers directly to 8100 systems.

The 8160 Model A announced last week will be available in June in 1M-, 2M- and 3M-byte main memory configurations. The larger 8160 Model B, which was announced last October, comes in 2M-, 4M- and 6M-byte configurations.

Aside from offering a smaller main memory, the 8160 Model A processors are virtually identical to the 8100 Model B processors, an IBM spokesman said. The A models were announced to offer users of the smaller 8140 processors a more convenient bridge to the 8100 line, also explained.

The 1M-byte 8160 Model A costs \$75,000, the 2M-byte version costs \$82,500 and the 3M-byte machine is priced at \$90,000. Volume discounts ranging from 10% on purchases of five Model A systems to 35% on purchases of 45 or more systems are available.

Besides the 8160 Model A, IBM last week also announced the 8102, a double-density version of the 8101 disk drive. The 8102 is available in two 139M- and 360M-byte capacities; the single-density 8101 of-

See IBM page 4

ed world, you now have to have annual billings of \$50,000 or more (making you a major account, as distinguished from a primary account, which spends less than \$50,000 per year with AT&T Communications). Clarke maintained that he was never told this and, further, that AT&T has apparently never bothered to figure out who falls into the new category.

The second thing that Clarke learned from his contact was that "wasted delivery" for DIS circuits, the time frame in which the company claims it will install a new circuit, is now 48 business working days. Before diversions, Clarke said, he could count on getting a DIS circuit installed within 22 working days.

And this, apparently, is not a singular case.

James Barr of AT&T Communications  
See AT&T page 8

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NEWSPAPER

## NEWS

## Panel studies plan to track cash transfers To provide 'dirt' on laundering

By Patricia Koehn  
CI Staff

WASHINGTON, D.C. — An automated tracking system may one day provide federal officials with the dirt on illegal money laundering schemes, but at least one federal law enforcement official does not think the system is necessary.

At the suggestion of its chief counsel, James Harman, the President's Commission on Organized Crime is studying a proposal to establish a computerized system that will track all large cash deposits and international wire transfers involving U.S. banks.

It is hoped that by computerizing "from A to Z" the channels through which these funds travel, more pertinent information will be recovered faster for law enforcement use, according to a spokesman for the commission.

Noting that some banks have looked the other way concerning suspicious transactions, the spokesman said the commission hopes a computerized system will work together with a "volunteer effort on the part of the financial community to report information more quickly than they do [now]."

### Building a system model

The commission is in the process of holding hearings on the concept, as well as meeting with its financial and DP experts to define a system model better. A task force is being formed that will include representatives from the American Banker's Association, he added.

Federal law requires that reports be filed on cash deposits of \$10,000 or more in U.S. financial institutions. Reports compiled manually have taken as long as six months to be filed in a manner usable by Treasury Department analysts, confirmed a federal law enforcement official opposed to the plan, who requested anonymity.

The reports must be entered into a Treasury data base before a Treasury analyst can review the material, typically 45 days after the department's initial receipt of the data.

### Timeliness not a problem

Although proponents of automating the process estimate that Treasury analysts could receive the reports on the day the transactions occur, the official said timeliness is not a problem.

Analysts provide their results to other Treasury workers who are usually involved in long-term investigations, he said.

Other issues that the commission needs to consider, the official said, include a huge federal manpower shortage, the cost of the system vs. its benefits and the burden, if any, that will be placed upon the banking industry. He also suggested that as a result of a computerized system, the Treasury would be swamped with an increase in financial data, much of it useless for the department's purposes.

## Dictaphone sued for \$22.5 million

By James Connolly  
CI Staff

LOS ANGELES — The partners in a defunct word processing service bureau are seeking \$22.5 million in punitive damages in a suit filed here charging Dictaphone Corp. and Pitney Bowes, Inc. with fraud, negligent misrepresentation and operating a corrupt organization.

The federal court suit, now in the pretrial motions stage, charges that Dictaphone, a subsidiary of Pitney Bowes, cheated the Tharsana, Calif.-based Informacon when Informacon ordered a word processing system from Dictaphone in March 1983. Informacon, owned by Charles W. Gunther and Royce S. Plushman, lost more than \$100,000 and went out of business because the hardware and software packages that it leased failed to work properly, according to the suit. The suit also alleges that some of the products never even existed.

Dandy Witly, director of public affairs and public relations for Pitney Bowes, commented, "We are defending ourselves vigorously. We don't believe there is any basis for the suit." She noted that the court already has denied Informacon's motions for injunction against the defendants.

### Informacon owners deceived

The suit, in which Gunther's attorney, Richard D. Parkas, filed an amended complaint last month, alleged that Dictaphone representatives and advertisements deceived the Informacon owners into believing that they would receive Dictaphone's Straight Talk software and Omninet networking system. "The products did not exist when Dictaphone stopped producing and selling word processing hardware and software on Oct. 10, according to the complaint.

Witly said Dictaphone continues to service its installed word processing base.

The suit also charged that products Informacon did receive were defective. Those products included the Dictaphone System 8000, with defective features such as pagination, multiple access to a printer and multiple font handling, according to the suit.

"In truth and in fact, the defendants... never intended to supply word processing equipment with the capabilities as represented or to provide the continuing support as represented. The defendants well knew that they were unable to act as represented or to provide plaintiffs with the equipment as promised," the suit charged.

Other listed defendants, identified as current or former Dictaphone employees, were John Lindroth, Darrell Duran, Michael Pachelli and Emmanuel Westbrook.

## NEWS SUMMARY

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A leading discount broker introduced a nationwide service enabling investors to trade securities through their own microcomputers/4

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Howard Johnson Co. is moving processing power out to its restaurants and lodges in an effort to move data between corporate headquarters and remote locations/7

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Chernia executives said last week the U.S. government is prepared to retaliate against Japan if that country moves ahead with a controversial new software protection scheme/13

Inexpensive backup procedures have left many microcomputer users with disasters waiting to happen, panelists at a round table said last week/14

Middle managers will face an adopt-or-get-out crisis as office automation changes their roles and transfers some of their responsibilities to their underlings, an American Management Associations conference was told/16

With the advent of the presidential elections, the work load is growing for the people at the Federal Election Commission who must keep track of who is collecting and spending campaign funds/17

The Direct Marketing Association fears that the Internal Revenue Service plan to use computer matching to locate nonfiling tax payers will hurt the association's members/19

A study by Honeywell, Inc. found that office automation use is not widespread, but where it's used and the more it's used, the more satisfaction is expressed/22

A Yale professor's report maintains OA users must face three issues before reaping rewards of OA/23

The effective implementation of advanced office automation systems requires a broadening of skills among MIS managers, according to a number of specialists/26

A scientist who uses supercomputers to build numerical models of the sun helped uncover evidence that led to a significant solar finding/28

A public library in Washington state was swamped with enrollment requests when it began a unique, and free, computer education program/34

A tailored information center package helped Tally Industries, Inc. link its 16 diversified operating companies/36

A manufacturing resource planning system helps an instrument manufacturer schedule, track and control assemblies on the shop floor/40

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A fabric and well-covering distributor is using an information resource management system to weave its daily corporate business operation/43

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Conversion to an automated office model increased productivity and made possible higher quality reports and presentations to clients of SEI Corp.'s Funds Evaluation Division/47

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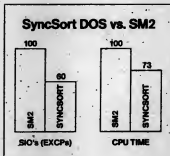
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# IN-LAWS

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less CPU Time and up to 70% fewer SIOs.

**2. BETTER PROGRAMMER PRODUCTIVITY.** SyncSort DOS has  
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perfect mate, give us a call. We'll send over one of our matchmakers  
to give you a personal demonstration.

Once you've seen SyncSort DOS in action, we don't think it'll be long  
before you call us with a familiar request: "Play it again, VSAM!"

## NEWS

## IBM, Merrill Lynch set financial service

NEW YORK — IBM and Merrill Lynch Pierce Fenner and Smith, Inc. have joined hands once again, this time forming a venture to market financial data systems and services.

Two years in the making, the Financial Services System announced here last week will allow the installed base of IBM's line of Personal Computers to communicate largely via satellite links with Merrill Lynch's host computers to obtain an array of investment data and services. The software for the nationwide system will likely be provided by Monchik-Weber Corp., although this company will not share in the 50-50 partnership of IBM and Merrill Lynch in marketing the system.

The partnership will act as a systems integrator and reseller, selling software, workstations, branch office and regional processors, real-time market data and related communications network services.

The prototype system, unveiled at Merrill Lynch headquarters, combines market data, information from

stock exchanges and news services with advanced office automation and enhanced communications services tailored to meet the needs of Merrill Lynch's individual investors, the companies said. A pilot installation will not be up and running at a Merrill Lynch office until the second quarter of 1985, with a company-wide ramp-up by the end of that year, a Merrill Lynch spokesman said.

### Integrated systems

The venture's product offering will combine IBM Personal Computer-based workstations and host computers with market data and financial services programs provided by Merrill Lynch. The two companies will market these integrated systems to brokerage firms, commercial banks, money managers and the private clients of these firms.

Two special features use of the IBM 3270 Personal Computer, which will be used by the broker's account executive to track selected securities. Using the 3270-PC's win-

dowing capabilities, Merrill Lynch executives will direct the 3270-PC to place calls automatically to clients interested in any of the 300 stocks the 3270-PC can be programmed to track.

At the same time, the executives will be able to use the workstations to run applications such as financial spreadsheet calculations, access customer files from a host system and update mailing lists, the companies claimed.

The workstations will be connected to a brokerage office's computer to provide market data services as well as a range of office automation capabilities, including word processing and, eventually, electronic mail via regional or host computers, the partnership said.

The joint venture marks the second time the two companies have combined forces in the information services market. In 1982, Merrill Lynch became a principal provider of working capital for the IBM Credit Corp.; IBM's equipment leasing branch.

## IBM (from page 1)

fers a storage capacity ranging from 64K to 128K bytes.

By adding the newly announced 8102 drives, users of IBM 8140 and 8150 processors can store up to 1G byte of data.

The maximum amount of disk storage previously available was 518M bytes.

### Combination of drives

Users can also mix any combination of 8101 and 8102 drives. Up to two drives can be attached to the 8104 Model A processors, up to three can be attached to the 8180 Model B, and four drives can be attached to the 8140 and 8150 processors, a spokeswoman said.

By using four of the 3594K-byte version of the 8102, users reach the maximum 1G-byte disk capacity, IBM said.

The 1294K-byte version of the 8102, which costs \$21,000, is field-upgradable to the 3594K-byte unit, which is priced at \$33,500.

### Just availability

Both will be available in June, according to the spokeswoman. The older 1294K-byte 8101 costs roughly \$25,000.

IBM last week also announced the 8100 PC Adapter, a circuit board that can be plugged into the backplane of either an IBM Personal Computer or a Personal Computer XT to allow the micros to run either IBM applications simultaneously in IBM 3270 emulation mode or Personal Computer applications running under IBM's PC-DOS operating system.

The board also allows the micros to be directly attached to an 8100 system's loop wiring.

### Controller not necessary

Previously, a controller was necessary to attach a Personal Computer to the 8100 system, according to IBM.

The device eliminates the need to use special cabling or a stand-alone controller when attaching the microcomputers to an 8100 system, according to IBM.

Scheduled for July availability, the PC Adapter costs \$1,275, the spokeswoman said.

More information about the products is available from IBM, which made the announcements through its Information Systems Group, located at 900 King St., Rye Brook, N.Y. 10673.

## Fidelity service allows trading via micros

By John Ballantyne  
CWI Staff

BOSTON — One of the leading discount brokerage houses last week announced a nationwide service that enables investors to trade securities through their own microcomputers.

Fidelity Brokerage Services, Inc.'s Investor's Express service, which starts operation today, allows customers to enter buy and sell orders on listed and over-the-counter stocks and options using most microcomputers or Ascii-compatible terminals equipped with a modem.

Communicating through GTE Teletype Communications Corp.'s Teletype packet-switched network, customers

can access data bases residing on Fidelity's IBM 3083 mainframes at company headquarters here to obtain quotes, update their portfolios and review their tax records. Securities transactions entered by customers are reviewed by Fidelity's representatives and then transmitted to the stock exchanges through the firm's high-speed execution system, according to Fidelity President Robert L. Gould.

Securities trades can be settled automatically through a customer's Fidelity USA account or Fidelity money market fund, Gould said. He added that stock market quotes listed on the system are delayed approx-

imately 20 minutes, but up-to-the-minute quotes can be obtained through an optional feature.

Customers will be able to transfer data for off-line analysis to micro spreadsheets and graphics programs, including VisiCalc's VisiCalc, MicroSoft, Inc.'s Multiplan and Lotus Development Corp.'s Lotus 1-2-3.

Prices for the Investor's Express service include a one-time subscription fee of \$195 and time-sharing charges of 40 cent/min during peak hours and 10 cent/min off peak, with a minimum monthly time-sharing charge of \$10. Fidelity Brokerage Services is located at 58 Devonshire St., Boston, Mass. 02109.

## Bomb blast damages IBM office building

By David Weyers  
CWI Staff

RAREGON, N.Y. — A late-night bomb blast last week heavily damaged an office building here leased by IBM. A terrorist group claimed responsibility for the attack, saying that IBM had been singled out as a target because of its business interests in South Africa.

No one was injured in the blast that occurred at 10:45 p.m. on Monday, March 19 at 3000 Westchester Ave. Damage was confined largely to the exterior of the building.

"There was a lot of broken glass but no structural damage," an IBM spokesman said from company headquarters in nearby Armonk, N.Y. The spokesman could not, however, give an estimate of the dollar amount of damage. He said the building housed "general administrative offices" employing 150 people.

The Harrison Fire Department responded to the blast, which also caused slight damage to an adjoining building owned by the Bellville Corp., maker of Thom McAn shoes.

A known terrorist group calling itself the United Freedom Front claimed responsibility for the attack.

A written communique recovered in the parking lot singled out IBM as the target because of its business interests in South Africa," according to FBI spokesman Joseph Valiquette.

### Ten bombings

Since first surfacing in December 1982, the United Freedom Front has claimed responsibility for 10 bombings. Valiquette said the group is under investigation by the FBI/New York Police Department. Terrorist Task Force, but added that the FBI was "not prepared to say how large a group it is."

The terrorist group has named South Africa as the reason for each attack.

"We do business there," IBM's spokesman said when asked about the computer maker's dealings with South Africa. He said the company employs about 1,000 people, primarily in sales and service but also a small punch-card printing operation.

Revenues from the African nation make up less than 1% of IBM's total gross, he said.

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## NEWS

## 'HoJo' moves in-house overnight

### Converts national reservations system from T/S service

By Paul Olm  
CW Staff

QUINCY, Mass. — It's 9 p.m. on a Friday night. You have 16 hours to switch an entire data center from Orlando, Fla., to a new location in Massachusetts.

If you are successful, the network will go on-line at noon the next day without a hitch.

If you fail, you will have a week to ponder what went wrong before starting the whole process over again.

The scenario sounds somewhat like one of those popular adventure computer games, but the adventure was reality for the Howard Johnson Co. recently. In one hectic evening, the management information systems staff switched the company's nationwide reservation network and processing center from a time-sharing service to a newly created in-house network and DP center here.



OW photo by P. Olm

Waitress Karen Oates enters orders into Remanco Systems, Inc. RMIS 1600 point-of-sale terminal at restaurant in Braintree, Mass.

The move was no small task. Howard Johnson's national reservations network processes more than 600 member hotels and processes about 200,000 transactions per day. The software for the network was originally developed by National Car Rental System, Inc. and had been running on Martin Marietta Data Systems, Inc.'s remote computing service since 1980.

The decision to go in-house was motivated largely by cost. "Going in-house cut computing costs by about 25%, allows us to add applications and gives us control of our own destiny," explained Thomas Harries, director of data processing operations.

The savings were substantial despite the fact that the project required a major hardware upgrade. While Howard Johnson had been using an IBM 4341 for corporate data processing in its old data center, the new facility would include two IBM 3083s, one taking over the duties of the 4341 and the other handling the added burden of the reservation system. If the reservation system went down, the firm could easily switch over to the corporate 3083 and continue processing until the problem was repaired, Harries said.

The upgrade presented one problem on the corporate data side — all of Howard Johnson's financial software was written for IBM's DOS/VSE operating system, which does not run on the 3083. As a solution, the MIS department last spring installed IBM's VM operating system on top of DOS on the 4341 "just to get systems programmers up on it," according to Gary Singer, director of MIS technical services. The company now runs IBM's VM High-Performance Option on top of DOS on its new 3083 and plans to begin to convert to MVS later this year.

To make the transition as smooth as possible, the six Howard Johnson staff members who coordinated the conversion set up a configuration that Singer said is nearly identical to that at Martin Marietta. In November and December, the department staged two batch run-throughs, and in January it conducted two on-line run-throughs to test the hardware and software.

"If anything, this was planned to death," Harries said.

The tests involved flying copies of Martin Marietta programs and data from Orlando to Quincy, installing them in the Howard Johnson data center, switching communication lines to the member

Howard Johnson Co.'s Gary Singer on data center conversion: "You just have to plan it to death."

hotels temporarily to talk to the Quincy office and running trial transactions through the system.

Communications presented another problem. Because Howard Johnson had been relying on Martin Marietta's network to communicate with the local hotels, the company had to install a leased-line network of its own and switch between the two during testing. Installation of the network's eight nodes in Chicago, Los Angeles, St. Louis, New York, Atlanta, Orlando, Washington, D.C., and Oklahoma City was completed in November.

Singer noted that the installation was rushed through to get in under the wire before the AT&T breakup. "If we'd had to do the same thing today, it would probably take twice as long."

On Friday, Feb. 3, at 9 p.m., the nationwide reservation system was shut down. While operations nodes were being switched over to the Howard Johnson communications network and tests were being run, Martin Marietta in Orlando was backing up disk packs for the Howard Johnson network onto 21 magnetic tapes.

The tapes were taken by two Howard Johnson employees to a chartered corporate jet for the flight to Boston. To be safe, other copies of the tapes were flown in early the next morning.

However, the tapes need for the backup copies. The magnetic tapes were loaded onto the Howard Johnson disk packs and tested; both network and data center were running by 11:30 Saturday morning.

The key to a flawless conversion is foresight, Singer said. "You just have to plan it to death," he advised, "and don't burn your bridges. We took extensive steps to make it possible to continue processing if anything went wrong."

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## More than a conversion: New data center, upgrades, too

QUINCY, Mass. — The task of moving an entire national reservation network from a time-sharing service to an in-house DP center can present plenty of headaches, as the management information systems department at Howard Johnson Co. discovered here recently.

Not only did the department make the conversion, it also moved to a new data center and upgraded its hardware from an IBM 4341 to twin IBM 3083 mainframes, all in a matter of days.

At the same time, the switch gave the MIS department a chance to install some of the latest data center equipment, including a Halon fire extinguisher, power conditioners, air conditioning, two fully redundant water coolers as well as more working space.

However, the logistical details can be killers, said Thomas Harries, director of data processing operations.

"The biggest concern in moving was the fear of forgetting something," he recalled. "There's always that concern of whether we covered all the bases."

Some of the smaller items to consider included back generation of tapes, configuring communications gear to emulate that of the time-sharing service, wiring the building to plan for future growth, making printers compatible with the new hardware, planning the placement of cutouts in the raised floor and terminating the equipment in the right place.

One problem arose after the data center location had already been set near the top floor of the new office building.

"It was originally targeted to be under a restaurant until we realized the possibility of water damage," said Gary Singer, director of MIS technical services. "We moved it two floors down."

## POS system prepares data to go for HoJo

By John Gallant  
CH Staff

QUINCY, Mass. — As part of the reorganization of its information resources, Howard Johnson Co. is moving processing power out to its restaurants and motor lodges to facilitate the transfer of data between remote sites and the corporate data center here.

By month's end, 36 of Howard Johnson's nearly 1,300 restaurants and lodges will be equipped with a versatile point-of-sale (POS) system that enables managers at both levels to share payroll and financial information. Currently, data transfer between remote sites and the IBM 3085 mainframe is handled through dial-up telephone access, although future plans call for the uploading and downloading of data through Howard Johnson's leased-line reservation network.

The installation of the POS system is an integral part of Howard Johnson's recent moves to revamp its image and to refocus its data processing operations. This effort has also involved bringing DP functions in-house and relocating the data center to corporate headquarters here (see story on Page 6).

"Our thrust is to support this company during our period of change," said Eugene L. Daniels, vice-president of management information systems. "We aim to provide some type of processing system — whether it be a point-of-sale system or a microcomputer — for each of our properties."

As existing Howard Johnson and Grand Round restaurants are refurbished, the company is installing Remanco Systems, Inc. RMS 1600 POS equipment at a cost of approximately \$30,000 per site.

Installation of the Remanco equipment is taking place at a rate of three sites per month and has been underway since July 1982. While no decision has yet been made on how many sites will be equipped with the POS processors, said Thomas J. Harries, director of data processing operations, the company is currently focusing on its more profitable restaurants and lodges.

The 16-bit microprocessor-based system functions in a dual role at the Howard Johnson sites. Waiters and waitresses enter orders from input stations on the restaurant floor, while 80-character printers print the orders for bar and kitchen workers and produce an laminated bill for the customer. The "back-office" portion of the system, which includes a CRT and an 80-character printer, automates a variety of management functions, including inventory control and personnel management.

The Remanco system is also equipped with a Cobol compiler that enables Howard Johnson's programming staff to develop application programs for the system. It has already helped programmers develop a payroll reporting program and a spreadsheet-like sales and cash report similar to manual forms already in use. Managers in restaurants without the POS equipment must complete and mail those forms to corporate headquarters each week for clerks to input to the mainframe.

At those locations equipped with the Remanco system, the payroll and financial information is input to

what Harries described as "blank electronic forms" downloaded each week from the data center. The completed reports are then transmitted back to corporate headquarters via a modem, avoiding mailing delays and saving keypunch costs.

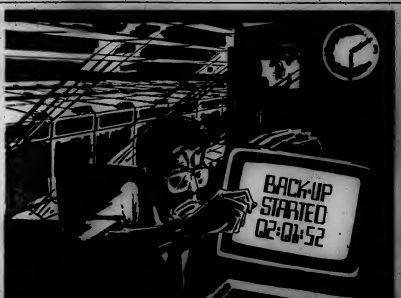
"We handle nearly 30,000 paychecks each week. With a two-day mailing window at each end, that leaves us with just three days to process all that data," Harries observed. "In addition, the Postal Service is threatening to stop mail movement on weekends. That would leave us only one day, and that's physically impossible. This system allows us to collect that data at the end of each

week automatically without delay."

Howard Johnson plans to develop additional applications for the Remanco system, including programs that will utilize valuable marketing information amassed automatically in day-to-day operations. Harries said 12 restaurants equipped with the POS processors have been selected to perform nationwide market research, including menu planning and item movement studies.

Harries also noted that Howard Johnson's MIS staff is studying modifications to the company's leased-line reservation network that will accommodate data transfer to and from the systems during off-peak periods.

Order, inventory and employee data from the Grand Round restaurant is stored in a Remanco Systems, Inc. review and updated weekly to the corporate mainframe.



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## NEWS

# SAS Institute releases full screen editing facility



OW AT 500M '84

**HOLLYWOOD BEACH, Fla.** — At its international users group meeting here last week, SAS Institute, Inc. introduced a full screen editing facility for its full range of products. The SAS Display Manager allows the user to interact with programming statements, logs and procedure outputs without leaving SAS, a spokesman said.

The tool splits the screen into two parts, with the top half displaying the SAS log and the bottom half

showing the program entry and edit area.

SAS statements can be typed into the program screen, reviewed and edited without affecting the log, the spokesman said. The program lines are not entered until the job is submitted, at which point the result is displayed in the log.

#### Statements, errors displayed

The log displays statements submitted to SAS from the program screen, together with notes or error messages. A scrolling facility is provided.

When the program statements submitted contain a procedure step that produces printed output, the Display

Manager displays the output one page at a time.

After the last page is displayed, reviewing can be continued in page or line mode or the user can return to the program/log screen.

In addition, the user can copy external data sets, edit files and submit them to run without leaving SAS, the spokesman noted. A save command enables all program lines to be copied into an external file and then recompiled into the user's file.

#### Special function keys

Programmed function keys are employed for special functions, which may vary depending on whether the program/log screen or output screen

is employed. Editing keys are used for standard editing functions and may be used both to edit program statements in the program screen or to enter commands on the command lines of the log screen or output screen.

The Display Manager has already been shipped to current users of SAS products in Digital Equipment Corp. processors. It will be made available as an enhancement to IBM mainframe users later this year, the spokesman said.

The option will be bundled into the next maintenance release of SAS, the company said. More information is available from SAS through Box 8000, Cary, N.C. 27511.

## TAPE from page 1

than the older model. Maintenance requirements have also been cut, according to IBM, which said the new units need only weekly cleaning.

#### Announcement remarks

Commenting on last Thursday's announcement of the new drive, which had been rumored as imminent for more than three years, Jack Hart, director of professional services at International Data Corp., a Framingham, Mass. research and consulting firm, said the new products mean

IBM has "really gone back into the tape drive business."

After several years of losing ground to Storage Technology Corp. in this line of business, Hart said that IBM has finally admitted to itself that "high-speed sequential processing with removable storage medium is still an important factor in many large DP shops, and it's not going to go away."

He noted the new drives, despite their improved speed and data buffer, use data cartridges that hold 200M bytes, only a slight improvement over the older 165M-byte reels.

Users will still need at least six storage cartridges to dump one 3880 spindle.

But, he added, the advances in space, power, cooling and maintenance requirements will be very attractive to users.

Also, he said, the error rate of the new unit is "phenomenal." IBM said the 3480 units will experience less than one permanent error for every trillion characters read.

#### Pricing structure

The company said the 3480 will be available in the first quarter of 1985. The 3480 Model B22 tape unit, containing two drives, is priced at \$45,120. The A22 controller costs \$65,430. IBM said a typical 3480 subsystem, consisting of one controller and eight drives, is priced at

\$237,910. The tape cartridges cost approximately \$14 each in quantities of 10,000.

Volume purchase discounts start at 4% for 10 units, according to the spokesman. More information on the 3480 is available from the IBM National Accounts Division, 1133 Westchester Ave., White Plains, N.Y. 10604 or the IBM National Marketing Division, P.O. Box 2150, Atlanta, Ga. 30666.

The company added that the 3480 models 4, 6 and 8 will continue to be sold. More information on the 3480 is available from the IBM National Accounts Division, 1133 Westchester Ave., White Plains, N.Y. 10604 or the IBM National Marketing Division, P.O. Box 2150, Atlanta, Ga. 30666.



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## AT&T from page 1

admitted in a session at the recent Interface '84 conference that the company is "having trouble getting [DOE and private-line] orders completed." Barr said that AT&T has assigned a full-time vice-president to resolve this conflict and has written him a blank check.

The problem, it seems, is that today at least three companies are involved in the installation of a DOE circuit. An order is placed and processed by AT&T Communications, which provides the long-distance portion of the service.

The local circuit is installed and maintained by the local telephone company, which also provides a fancy jack called a Customer Service Unit. And the Digital Service Unit (DSU), an interface device, can be procured from a number of companies, including nonregulated AT&T

#### Information Systems, Inc.

If you can find all the necessary pieces, you then have to orchestrate the installation. This is no mean feat, Clarke said, considering that AT&T Information Systems will not even take an order for a DSU (which may take 60 to 90 days to receive), let alone install one, until the DOE line has been run out to the customer's premises.

In related experiences, Clarke said he has been quoted waiting periods of four to six months for SAS bit/sec DOE lines, and in January he tried to order a 1.54M bit/sec T1 circuit from AT&T. "After the AT&T person stopped giggling, he told me that they couldn't deliver a T1 prior to the third quarter of '84."

Clarke classifies himself as a small to intermediate-size user and wonders if his experiences are typical of the class of service other users his size are experiencing.

## CORRECTIONS

exactly how many.

A photograph in the Jan. 23 System and Peripherals section was incorrectly labeled as the Unidat System, Inc. Cerbera system. The depicted product was the Unidat Corp. System 4000.

An announcement in the Jan. 23 Microcomputer section, "Wincheser System, Inc., DataSafe-8 MD8-256," incorrectly identified the MD8-800 microprocessor development system as a product of Mohawk Data Sciences Corp. The microprocessor is an Intel Corp. product.

In "Despite late entry into 3880 market, Amadahl competitive" (CW, March 13), Bob Williams, Storage Technology Corp.'s (STC) division vice-president for I/O products, was quoted as saying that STC has installed about 100 IBM 3380-compatible disk drives.

While the firm admits it has 3380-look-alike drives installed in about 100 sites, a spokesman said most sites typically have more than one drive; therefore, it has several hundred 3380-type units installed. The spokesman did not, however, state

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*\*Fred Buckley is Cullinet's Manager of Manufacturing Applications Software Development. His efforts have been crucial in achieving the integration that makes Cullinet's manufacturing system unique. Fred joined Cullinet in 1977. Fred holds a degree in Computer Science from Thomas Valley State and is a member of the American Production and Inventory Control Society.*

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Chicago, IL	May 30	New York, NY	May 15
Cincinnati, OH	May 14	New York, NY	June 12
Cleveland, OH	May 14	Oakland, CA	June 24
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Dayton, OH	June 15	Pasadena, PA	May 16
Des Moines, IA	May 18	Regina, SK	June 12
Des Moines, IA	May 22	Rochester, NY	May 28
Des Moines, IA	June 7	Rochester, NY	June 23
Grand Rapids, MI	April 19	St. Louis, MO	May 18
Grand Rapids, MI	June 7	San Francisco, CA	May 24
Hartford, CT	May 9	San Jose, CA	May 15
Hartford, CT	May 9	Seattle, WA	June 12
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Indianapolis, IN	May 4	Toronto, ON	May 17
Kansas City, MO	June 23	Toronto, ON	June 12
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## NEWS

# User tells what it takes to start area users group



OW AT SUN '84

By Paul Gilman  
OW Staff

**HOLLYWOOD BEACH, Fla.** — Some people are leaders and some people are followers, but when it comes to starting a users group, it's probably up to you to take the lead. Speaking at the SAS Institute, Inc. Users Group International (Sugi '84) conference here last week, a member of an SAS users group in Hartford, Conn., outlined some of the factors that need to be considered in starting a regional users group.

Jim C. Knoop of Aetna Life and Casualty Co. in Hartford said creating a users group requires a substantial investment of time and some careful planning. The three most critical actions to initiate up front include assessing the feasibility of a regional users group, contacting potential members and preparing for the first meeting.

In assessing feasibility, Knoop said, it is first important to confirm that no duplication of effort is involved. Contact the vendor company directly to find out if any users groups are in the area or are already

in the planning phase, he suggested.

It is also important to determine that there are enough users in the area to make a group feasible, he added.

If the opportunity is there, you must decide whether you have the time and resources to commit to the start-up effort, he noted. "There's a tendency to just wait for something like this to happen," he said. "Just face the fact that you have to start the group."

The basic resources you need are time, a commitment both from management and yourself, a fixed mailing address and telephone number and resources to handle the postage costs, he said. The best method is to talk to your direct manager to get approval for the formation effort. Trying to obtain commitment at the corporate level can quickly kill the idea.

Start by sending a notice to vendor publications informing them of the effort. Include a list of the specific topics you would like the group to cover. Also contact the vendor for a list of local installations. "Many companies have users in a variety of departments who don't even know about each other," he said.

You will probably have to provide your own facilities for the first meet-

ing, Knoop said. The best time for a meeting is generally in the mid-afternoon in the middle of the week. Announcements mailed to local users should inform them of the time and date, directions, parking instructions, agenda and response information.

Provide space for potential members to list the products they use, their interests and proficiency and their expectations of what functions a users group should embody, Knoop suggested. "The importance of this is that you

don't get bogged down in a lot of housekeeping at the first meeting, and you have a chance to focus on the topics people want to cover."

Don't set your sights too high at the first meeting either, Knoop advised. "When push comes to shove, the only thing you really have to do is schedule the next meeting," he noted. "Try to define the next presentation, select topics and speakers." To keep participation active, try to schedule another company's site for the second session.

Be prepared to give the first presentation yourself, but make an effort at the first meeting to assign the second presentation to someone else within the group. The key is to provide direction and leadership, but

also to stress the participation of other members in group activities, he said.

Over the first few meetings, ground rules should be laid down for frequency, length of meetings and time, he said. Decide whether the structure is going to be formal or casual. And determine whether your group should be oriented toward a broad range of products or toward specific topics.

Leadership should be ad hoc, with volunteers taking on as much of the leadership role as possible and rotating assignments between them.

Try to mix future sessions between panel discussions, seminars and traditional lecture formats to keep members interested. And don't forget the importance of social events, he said. "One of the biggest responses in the Hartford area was toward meeting other people," he said. "Try to mix things up. It sounds childish, but try to get people to sit next to [people they don't know] at meetings."

Expenses can be handled through corporate contributions in kind, "pay-as-you-go" meetings or even revenue-generating measures such as seminars for other users. You should also look into the possibility of pursuing joint ventures with other area users groups, he said.



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## NEWS

# Wang chief decries adversarial vendor-user relations

By John Kheiser  
CW Staff

WASHINGTON, D.C. — Wang Laboratories, Inc. President John F. Cunningham told an office automation conference here last week that an adversarial relationship between vendors and users of office systems is inhibiting technological innovation and worker productivity.

Delivering the keynote address at the annual Federal Office Systems Expo (Fose '84) here last Tuesday, Cunningham said a trend toward co-operation among vendors in support of systems standards and compatibility is fueling "the move from a ven-

дор-driven market to one where users really influence the vendor's products and services."

Popping on a theme that mirrors Wang's technological and business strategies, Cunningham said the key to innovation in office systems is compatibility. "Serving the end user means compatibility, because [that] will mean survival and growth."

According to the Wang executive, "user-driven trends" show that "major opportunities will go to those vendors who support the levels of compatibility and standards required by large organizations. We have a long way to go before compatibility be-

comes more than the lowest common denominator of vendor features ... but we have made progress."

Pointing to accelerated acquisitions and mergers, joint ventures to develop and market new products and "the move to agree on de facto standards," Cunningham said vendors realize that if they want to sell to more than just niche markets, closer relationships between firms "will be necessary in order to compete in a new and huge marketplace." As to the products themselves, Cunningham commented that "R&D departments everywhere are humming."

"The whole objective of special-

ized communications and truly integrated office systems," he said, "is to make good finally on the claim that the system must support the individual user the way the user wants to be supported — at the desktop level."

This "vision of the office," he continued, "has a lot in common with a larger cultural trend toward more local autonomy — not at the cost of weakened central authority, but with the help of better centralized standards." Toward that goal, "we have to break all traces of a vendor-user adversarial relationship if we're going to regain our leadership as a nation in the worldwide economy."

## Former SDC consultant pleads guilty in Mass. contract case.

By Patricia Kneaf  
CW Staff

ALEXANDRIA, Va. — A former marketing director and consultant for System Development Corp. (SDC) last week pleaded guilty to charges of wire fraud, bribery and income tax evasion stemming from three separate incidents. As a result, M. James Errico faces up to 21 years in prison and fines of up to \$31,000.

Errico avoided trial by pleading

guilty and will be sentenced April 19. He was indicted last month on two counts of wire fraud, attempted bribery and interstate travel in aid of racketeering in connection with efforts to influence the award of a \$3.4 million Massachusetts state contract. Errico was accused of providing a consultant hired by the state Welfare Department with future SDC consulting work in exchange for helping to have the programming contract

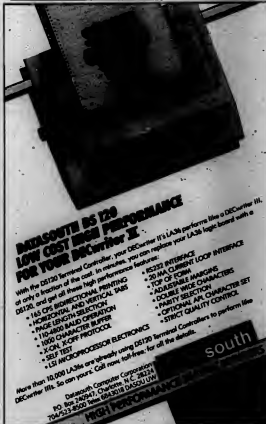
awarded to SDC [CW, Feb. 20].

SDC is currently developing for Massachusetts a Medicaid Management Information System (MMIS), which is expected to undergo review for federal certification in June. Although the development contract has been plagued by delays and threats of cancellation, Welfare Commissioner Charles Atkins recently expressed satisfaction with SDC's performance.

However, a provision in the MMIS contract would allow the state to fire SDC if Errico were to be convicted. Attempts to reach state Welfare offi-

cials at press time to determine the impact of Errico's guilty plea were unsuccessful.

Errico also pleaded guilty to bribery in a separate case involving the Department of Energy (DOE) between 1980 and 1981, after authorities investigating the Massachusetts bribery scheme turned up other facts concerning payments made to a DOE employee in exchange for a kickback on another federal contract. As a result of other information, Errico also pleaded guilty to charges of failing to file a personal income tax in 1978.



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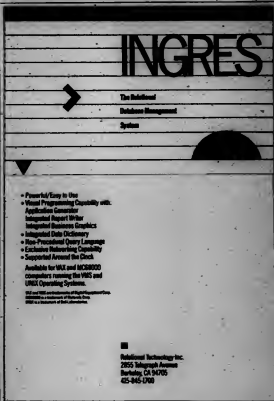
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## NEWS

## NTIA backs former BOCs on FCC conversion restrictions

By Paul Wines  
CW Washington Bureau

WASHINGTON, D.C. — The recently divested Bell operating companies gained powerful support this month in their efforts to get out from under the restrictions imposed by the Federal Communications Commission's Second Computer Inquiry decision.

The FCC modified some conversion restrictions last November, but left two key provisions intact. As a result, beginning June 30 the local operating companies will have to form separate subsidiaries if they wish to market enhanced products and services, and they will have to obtain a commission waiver before performing end-to-end protocol/code conversion directly. Earlier this month, the National Telecommunications and Information

Administration (NTIA) — the president's chief telecommunications adviser — supported requests from several local operating companies seeking to eliminate the protocol/code conversion restriction.

FCC reconsideration of this ruling is "especially important," the NTIA said, because "provision of such functions at the telephone company's central office may be essential to promote wider availability of ... information retrieval, electronic banking and computer communication services. With the greatly increasing popularity of word processors, personal computers and other low-cost data processing

units, the number of potential users of enhanced services and sophisticated [customer premises equipment] is expanding rapidly."

The counterargument is that if the local operating companies are allowed to provide end-to-end protocol/code conversion directly, they will gain an unfair advantage over their competitors.

As the Computer and Communications Industry Association put it in comments filed March 12, the local operating companies' "regional coordination through regional holding companies and their national coordination through [Bell Communications Research, Inc., formerly the Central Services Organization] is ample evidence of broad-based control of bottleneck facilities."

This argument over Computer Decision II's application to the local operating companies comes at a time when several of the companies are reportedly planning to implement new "smart

network" services.

For example, officials of Bell South, one of the seven regional holding companies created by the breakup of the Bell System, confirmed that the company plans to file a tariff within the next few months covering a packet-switched service called Pulscom.

## Mumps sets June meet

PHILADELPHIA — The Mumps Users Group will hold its annual conference June 4-8 at the Adam's Mark Hotel here. On the agenda are presentations, tutorials, workshops and round table discussions focusing on implementations, new technology and applications of the Mumps language.

For nonprogrammers, there will be introductory seminars on Mumps programming.

The \$150 registration fee includes a one-year individual membership in the Mumps Users Group, as well as admission to technical sessions, round table discussions, the exhibit hall and social activities. Each full-day tutorial costs \$120.

More information is available from the Mumps Users Group, Suite 305, 4331 Hartwick Road, College Park, Md. 20740.

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## Cbema: U.S. might retaliate if Japan OKs software plan

### Controversial copyright protection proposal fires industry, government responses

By John Klineham  
CW Washington Bureau

WASHINGTON, D.C. — Computer industry representatives last week said the U.S. government is exploring ways to retaliate against Japan if it proceeds with legislation that American vendors

say will greatly reduce software protection in that country.

The U.S. Congress could retaliate by stripping Japanese vendors of all copyright protection for computer programs as well as for operating systems and firmware of

products sold in this country, according to Oliver Smoot, executive vice-president of the Computer and Business Equipment Manufacturers Association (Cbema).

This reaction is permissible, Smoot said, under the terms of the Universal Copy-

right Convention, to which both the U.S. and Japan are signatories. He indicated that Cbema has been in contact with attorneys in the U.S. Patent Office and in the trade agencies who are working on specific legislative language that Congress

would need to institute the retaliatory measure.

Smoot and Cbema President Vice-Henriques told a press conference here last Monday that the action could be taken if the Japanese Ministry of Trade and Industry (Mitl) goes ahead with a plan to recommend a new Japanese legal structure for software protection. The Mitl proposal would replace copyright protection with a new law reducing protection to only 15 years and giving the ministry authority to mandate compulsory licensing of foreign software to Japanese and users in certain cases.

Mitl has until March 27 to propose legislation if it wants the matter considered during the current session of the Japanese parliament. U.S. trade officials have been negotiating with their Japanese counterparts to kill this idea. The Cbema press conference was called to support the government efforts, according to Henriques, who said Mitl "evidently thinks we aren't serious in our opposition" to the proposal.

Cbema has contacted similar associations in six European countries and in Australia and New Zealand. "The consensus is that copyright is clearly the way" to protect software, he said. He suggested that if Mitl goes ahead with its proposal, Japanese vendors could face retaliation in a number of markets.

The copyright convention would allow the U.S. to pass a law offering copyright protection to Japanese vendors equivalent to that afforded U.S. firms in Japan. In other words, Smoot said, if Japan eliminates software copyrights for a new type of protection, the U.S. could also eliminate copyright protection and not replace it with a new law, leaving Japanese firms with no general system of software protection.

Although the Japanese do not have a large share of the U.S. software market, the elimination of copyright protection could also affect proprietary operating systems and control sequences embedded in read-only memories, according to Smoot. This would affect a great amount of Japanese-made hardware.

Because the U.S. industry has been working on this issue in close cooperation with high-level administration officials, including Vice-President George Bush, Commerce Secretary Malcolm Baldrige, U.S. Trade Representative William E. Brock and the staffs of relevant Senate and House committees, Henriques said Cbema is confident of "very strong support" for retaliation against Japan if the Mitl proposal goes forward.

Nowadays, technology is advancing so rapidly that today's latest breakthrough may be replaced as soon as tomorrow by something even more revolutionary.

As this ever-changing technology becomes more and more available, it becomes more and more confusing to choose the precise technology to suit a particular need. All of which makes it difficult for the human mind, which is not programmed to adjust to change quite as quickly to cope.

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## NEWS

# Threats greater than hacking seen facing micro users

By Paul Hameshewski  
City Staff

**NEW YORK**—While hackers and white-collar criminals have been portrayed as the principal threats to data security, they do not represent the chief concern of a manager responsible for managing microcomputer growth.

"Look at the statistics concerning data lost from power fluctuations," said William O'Neill, director of microcomputing at The First Boston Capital Group, Inc. in Tarrytown, N.Y. "Most of our time is spent recovering data lost from an electric problem."

O'Neill and five other panelists—representing Hewlett-Packard Co., 3Com Corp., Tallgrass Technologies Corp., the "Boyhold Report on Professional Computing" and Archive Corp.—participated in "Data Security Issues in Microcomputer Applications," a round table sponsored here last week by Tallgrass.

The swift growth of hard disk systems, a rapid change in the type of workers using computers, a lack of vendor-provided education and hard-to-use software have left many microcomputer users with disasters waiting to happen, the panelists agreed.

"It usually takes a catastrophe before a user understands the importance of adequate backup," industry analyst Andrew Seybold claimed.

"I've seen forecasts on IBM Personal

**'Education is the key. Users have to realize there is a problem before they will address it'**  
— industry analyst Andrew Seybold.

Computer XT and does not indicate which drive to format, the machine formats the hard disk and wipes out all data on it," Seybold noted.

The problem of inadequate backup will increase as microcomputers use sophisticated operating systems, such as Unix; as corporations store data on microcomputers; as Winchester disk storage capacity increases; and as less sophisticated workers use microcomputers, the panelists said.

"The situation will become much worse in the future," Frank P. Caruso, HP research and development section manager, warned.

But vendors are ignoring the problem, panelists added. "It would like to see one commercial with Charlie Chaplin loading and unloading 10 diskettes to back up the hard disk records of the Little Hat Co.," O'Neill stated.

"IBM is setting microcomputer standards and has a responsibility to address the problem of backup procedures for microcomputers," O'Neill said.

Panelists advocated educating users, developing software with simple backup procedures, incorporating backup capabilities in hardware and

establishing simple corporate backup procedures.

"Education is the key," Seybold maintained. "Users have to realize there is a problem before they will address it."

Retailers and corporate microcomputer support groups, as well as vendors, have to educate users. "We are finding more retailers including backup equipment in the system sale," David Allen, president of Tallgrass, said.

Current backup software procedures are hard to use. "A user will not sit and swap 10 disks," Bill Krause, president of 3Com, said. "Backup is not the principal benefit; a simple-to-use restore function would be. Currently, that feature is not available."

Microcomputer software should include features from mainframe software, according to O'Neill. "Microcomputer software should always include audit trail reports," he said. "Knowing who was the last person to use a package and what changes he made is vital in any large company."

Hardware today offers inadequate backup facilities. "The floppy disk will become the punch card of the 1980s," Krause predicted.

Hardware should incorporate sophisticated backup facilities. "We must begin to view a backup device as peripheral to a peripheral, the disk drive," M. Thomas Maksman, president of Archive, said. Optical disks, tape cartridges and removable Winchester disks were mentioned as some possible solutions to the problem.

Corporate planning is needed. "Backup procedures are a way of life with mainframe users," Seybold said, "but there are few mainframe users with any type of microcomputer backup procedures."

To succeed, plans must be simple. "Mark one tape Tuesday, Thursday, Saturday, the other Monday, Wednesday, Friday," Allen recommended. "Then assign an employee to collect the tapes every night."

Once these policies and enhancements are in place, microcomputers can help protect data, according to O'Neill. "Microcomputers can be used to check the way a user logs on," he said. "If a procedure does not match a user's normal pattern, he will be denied access to the system. The microcomputer can be used to secure mainframe data."

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## NEWS

# Vision systems still in infancy but promising



## PRODUCT SPOTLIGHT

By Tom Ichniowski  
CWI Staff

Perhaps the least understood aspects of artificial intelligence are two functions that many humans take for granted: seeing and hearing. Humans rarely think about their ability to recognize a familiar face or voice; it is all done automatically by the brain, which can compensate for major differences in the way information is received and processed.

For developers of artificial intelligence systems, the ambiguity involved in human hearing and vision causes monumental problems. While humans can easily adapt to changes in their environment, machines cannot.

Researchers agree that both vision recognition and voice recognition machines are in their infancy. Of the two, however, vision systems appear to have experienced greater success. Optical character recognition (OCR) systems, such as those that can read bar codes and specialized type, have been around for some time. Lately, companies like Kurzweil Computer Products, Inc. of Cambridge, Mass., have improved basic OCR technology by adding artificial intelligence features to OCR readers. With the help of an operator, Kurzweil's 6000 machine, for example, can learn new typefaces.

Vision systems have also recently gained popularity as stand-alone factory floor devices performing functions like inspection, robot vision and gauging.

More than 75 companies currently offer vision systems. Many of these vendors have appeared over the past year, according to Howard Dichen, president of DM Data, Inc., a Boston, Ariz., technology research firm.

Only a handful of vendors is competing in the speech recognition market. The reason is that it is much easier to understand how the human eye works than how the human ear works, said Dr. Robert J. Shillman, president of Cognex Corp., a vision recognition firm in Needham, Mass. Shillman explained that cameras can be set up to analyze an object in much the same way humans do.

Typically, that analysis takes one of two forms: The camera can be trained on a fairly large area, called an area array, or it can be set to view a slice of the overall picture, called a linear array. The latter approach can be especially useful in situations where the vision system is recording numbers, labels or some specialized codes.

Compared with the human eye, however, vision systems are far from complex. "Understanding human perception is a very difficult task," Shillman said, adding that the more complex the application, the more difficult it is to develop a vision system to handle it.

So why use a vision system? Dr. Philippe Brou, a research scientist at MIT's Artificial Intelligence Laboratory in Cambridge, pointed out that vision systems can perform many simple, extremely boring factory

*Why use a vision system? Dr. Philippe Brou, a research scientist at MIT's Artificial Intelligence Laboratory in Cambridge, pointed out that vision systems can perform many simple, extremely boring factory jobs, such as inspection tasks. And sometimes, they can perform these tasks better than humans. Machines do not get bored, nor do they suffer from personal problems or illnesses, which can affect the quality of a human's work. Moreover, for highly technical applications such as determining whether a metal object is flat, vision systems can be far more accurate than the human eye.*

jobs, such as inspection tasks. And sometimes, they can perform these tasks better than humans. Machines do not get bored, nor do they suffer from personal problems or illnesses, which can affect the quality of a human's work. Moreover, for highly technical applications such as determining whether a metal object is flat, vision systems can be far more accurate than the human eye, Brou noted.

Presently, however, vision systems are so simplistic that it is sometimes more efficient to have a human performing the job, Brou admitted. First, humans can adapt to changes in their environment almost instantaneously; machines have to be retrained. Secondly, humans can perform many functions at once, some of which have been learned through experience rather than special training.

It is not surprising, Brou said, that many of the currently available vision systems cost in the \$50,000 to \$500,000 range. In applications where the complexity of a vision system would require a product costing more than about \$50,000, the MIT researcher said, it is often more economical to hire humans to perform the job.

### Big problem

One of the big problems with vision systems is that virtually all that are commercially available are based on the same two-dimensional technology. Most were designed around a set of algorithms developed at the Stanford Research Institute in Menlo Park, Calif.

According to Brou, this approach involves using a video camera to take

a picture of an object, typically in black and white. The object is then digitized, and the image is converted into a series of binary signals. The signals indicate whether a given aspect in the camera's view is black or white. From there, the vision system's central processor can reassemble the digitized signals to form an image.

Some firms have developed a variation on that two-dimensional theme, adding the ability to recognize various shades of gray in addition to black and white.

While Brou was quick to point out that two-dimensional systems are ideal for some applications, he said they are not very useful for others. He cited as an example a quality control application on a factory floor. A two-dimensional system may be fine to determine whether holes have been drilled in the proper places in a given object; the object, typically moving on a conveyor belt, would pass between a camera and a light source. The light would pass through the drilled holes and would result in white spaces against the black backdrop of the item.

But this approach is effective only if the holes were drilled all the way through the object. If the application involves testing to see whether holes have been drilled deeply enough into an object, the two-dimensional system would be of little help, because it could not perceive depth.

While the technology currently under way at MIT involves the development of vision systems that can perceive depth. This research may someday help overcome some of the problems presented by currently available vision systems. Brou said, because it could result in vision machines which would distinguish among different, overlapped parts.

Brou said several techniques to accomplish this are currently being investigated. Some use dual cameras, which view an object from different angles, but this process tends to be slow.

Cognex's Shillman said many commercially available vision systems offer the ability to link to larger computer systems; many, for example, offer RS-232 ports. Brou, on the other hand, said that most vendors of vision recognition systems have said they only minor attempts at linking vision systems to corporate mainframes, mainly because few users have demanded it.

### What the future holds

What does the future hold for vision systems? According to DM Data's Dichen, vision systems will undoubtedly become more sophisticated, and more vendors will hop into the market.

Dichen predicted that the vision market, which chalked up about \$30 million in sales during 1983, will jump to around \$700 million by 1990. While the growth in the vision market is expected to be dramatic, Dichen pointed out that other areas of artificial intelligence will be even better.

For example, natural language software, which reached over \$180 million in sales during 1983, will jump to a \$900 million market by 1990, according to Dichen.

Top 10 visual recognition firms based on 1983 sales

Firm Name	Type of System	Price Range	Estimated 1983 Sales Revenue
APRIMATICS 1000 Technology Park Dr. Billerica, Mass. 01821	Robotic and artificial vision systems	\$30,000-\$80,000	\$5 Million
EVERETT/CHAMBERS APPROXIMATE SYSTEMS, INC. 700 E. Harrison Ave. Pomona, Calif. 91767	Robotic and machine vision systems	\$25,000-\$75,000	\$4 Million
INSPECIFIC VISION SYSTEMS, INC. 538 Broadway Rd. Melville, N.Y. 11747	Visual recognition	\$35,000-\$25,000	\$2.8 Million (FY 1982)
COGNEX CORP. 72 River Park Dr. Needham, Mass. 01944	Visual recognition	\$30,000	\$2 Million
GENERAL ELECTRIC SYSTEMS OPERATOR 800 7th North St. Liverpool, N.Y. 13085	Visual recognition	Not Available	\$2 Million
INSPECIFIC VISION SYSTEMS CORP. 300 Powers Ave. Surreyville, Calif. 94088	Machine vision systems Intelligent robot systems	\$35,000-\$75,000	\$1.4 Million
PERCEPTICS, INC. 2300 Fremont Park Dr. Farmington Hills, Mich. 48324	Visual recognition systems	\$30,000	\$1.5 Million
GENCO, INC. 7 Corporate Place South Bedford St. Bedford, Mass. 01803	Visual inspection and recognition system	\$18,000-\$90,000	\$1.4 Million
APPLIED INTELLIGENCE SYSTEMS 110 Portland Pk. Ann Arbor, Mich. 48103	Visual recognition systems	\$17,000-\$70,000	\$1.0 Million
INSPECIFIC VISION SYSTEMS, INC. 521 Fern Ave. New York, N.Y. 10175	Visual recognition systems	\$20,000-\$25,000	\$1 Million

Source: DM Data, Inc.  
1. Based on estimated sales of available vision systems only. This figure listed may not reflect the total sales of the company.

## NEWS

# Middle managers told to adapt to changing OA roles

By James Connolly  
CW Staff

**BOSTON** — Office automation means that many decisions traditionally made by middle managers will pass to those below them, forcing managers to change their ways or lose their jobs, attendees at a conference here were told last week.

Citing a poll that showed a trend toward more clerical jobs and fewer middle-management positions in the future, David Cirullo, who is a senior development specialist for Wang Laboratories, Inc., said, "There will be less and less reliance on gut reaction and more and more on a manager's proficiency with skills using of-

fice automation."

Cirullo, addressing the American Management Association's Human Resource Conference, noted that middle management's traditional role has been to gather and disseminate information and to make decisions.

But in the information age, that information is being handled by clerical workers who can make many decisions. "Decision making is going to go down to the lowest level," he maintained.

This shift in responsibility means that during the next decade, clerical jobs will increase from 45% of a typical company's staff to 80%, while the share for middle managers will drop

from 40% to 20%, Cirullo said, citing a recent Harris Survey.

## "Somewhat important"

Cirullo said preliminary results from his own survey of 300 firms indicate that 91% of middle managers consider computers "at least somewhat important" and that computers are important to their organizations.

He warned that automation means fewer management jobs, but also more responsibilities for those who remain.

To ease the transition, firms must recognize the importance of user-friendly systems, ongoing training, teleconferencing and remote manage-

ment as companies shift to satellite operations away from the main office.

Another speaker at the conference, however, predicted that computers will have only a secondary impact on the middle-management work force. Eddie C. Smith, vice president for human resources at Robbins and Myers, Inc. of Dayton, Ohio, pointed out that during the latest recession, the unemployment rate for managers was three times that of the general work force.

The influx of the post-World War II baby-boom generation has provided the work force with highly educated management candidates, Smith said.

But their desired positions are already filled by persons only about 10 years older. He said that the shortage of management openings will only be "exaggerated" by cutbacks created by office automation.

Addressing the computer needs of middle managers, Lawrence F. Vogel, director of editorial services for The Office Systems Consulting Group, Inc. of Cambridge, Mass., observed that a new, younger generation of managers is more likely to welcome keyboards on its desks than are older managers.

Those younger managers are less likely to rely on secretaries to handle their word processing chores, he said.

He emphasized the need for ease of use, the ability to do work better with less effort. He then stressed the "level of flexibility" for example, the importance of giving a manager a computer tool to do a financial analysis that looks like it would on paper.

Finally, he cited the importance of a "degree of urgency," basically a negative factor that convinces a person that he needs a computer, even if it is only to produce a report on deadline.

## Robots 8 meet set for June 4

**DETROIT** — Robots 8, an exposition and conference of robotic scientists, industrialists, engineers and manufacturing executives, is scheduled for June 4-7 at Cobo Hall here. The conference is being sponsored by Robotics International of the Society of Manufacturing Engineers (SME) and the exposition by the Robot Institute of America.

"Merging Technologies" will be the conference theme, and 80 industry experts reportedly will explain new aspects of robot implementation, applications and research.

More than 230 builders and suppliers of industrial robots, services and components are expected to exhibit, a conference spokesman said.

Advance registration for the exposition is \$10. Registration for the full four-day conference is \$450 for SME members and \$510 for nonmembers. One-day and two-day rates also are available.

Registration forms are available from Robotics International of the SME, Box 930, Dearborn, Mich. 48121.

# UNIX & C

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CW-139

## NEWS

# FEC work load growing as campaigns gear up

By James Connolly  
Ch Staff

WASHINGTON, D.C. — When the Reagan-Bush '84 Selection Committee reported 78,600 political contributions worth \$4.3 million, the Federal Election Commission (FEC) was left with the task of computer indexing, microfilming and reviewing the 9,000 pages of reports.

While that filing was exceptionally large, it was only one of the thousands of election-year reports that the agency must process for public and in-house review, sometimes within 48 hours.

Established in 1971 through campaign reform legislation, the FEC handles a constant flow of information requests and financial reports, even in non-election years. But it is during a presidential election year that the work load reaches record proportions.

"The dollar volume increases and the number of transactions increases. For example, the dollar volume for a congressional election cycle will equal the numbers for the previous presidential election, and, two years later, the next presidential cycle will be even higher," said Bob Bierack, supervisor-statistician for the agency.

The FEC has a six-year, \$4 million facilities management contract with National Data Corp., which operates a Digital Equipment Corp. Decsystem-10 in Fairfield, N.J. That and related contracts make up about 5% of the agency's approximately \$11 million fiscal 1984 and 1985 budgets.

#### Handling storage capacity

The agency enters data from the reports at its headquarters here, and transmits it via four 9,600 bit/sec lines to Fairfield. Since it became active in 1975, the FEC has amassed data that has almost filled eight 176.6M-byte, disk drives. Bierack said that while the agency is nearing its storage capacity, "the biggest problem with the data base is that it is so dynamic." Paul Laramee, a supervisor systems analyst, added, "Even though we run an update every night at 7:00, when a person comes in to make a request the next day, the data may already be outdated by new filings."

Those filings are expected to peak in October and November, when candidates are likely to report up to 90,000 contributions per month just to meet the commission's public disclosure requirements. In addition to those reports, the commission receives separate reports, sometimes on magnetic tape, that can be fed into the mainframe, relating to candidates' requests for matching federal funds.

In 1984, the commission will process more than 28,000 documents.

While matching-fund requests are seldom requested by the public, the agency receives constant requests for quarterly and monthly campaign reports. Those inquiries may come from opposition candidates, public interest groups, the news media and political consultants.

Federal laws require the commission to index at least the first two summary pages of financial reports and to microfilm the full reports within 48 hours of their receipt.

Those financial summaries show how the candidates raised and spent their money.

After data entry clerks index the summaries, they code those pages according to the type of data reported, then they enter the names, addresses, occupations and other detailed information relating to individual contributions and campaign expenditures over \$400. The data is cross-referenced by contributors, as individuals or groups and by candidate.

Laramee reported that while data entry is now performed in-house, a contract for future work is now out

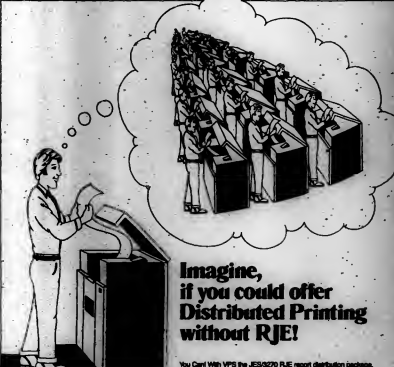
to bid.

Even as new reports pour into the office, the public access staff must deal with both on-line and batch-oriented information requests. During the six months ending in March, the agency handled more than 7,000 requests for one to 20 reports on an on-line basis, as people walked in off the street or telephoned requests. "At least as many" mail or otherwise less timely requests were batch processed, and 24,000 on-line internal accesses were processed during that time, said Richard Hooper, supervisor systems analyst.

Such requests and data are en-

tered on the agency's 88 terminals, which include DEC VT100s, Puthier-Kear Corp. Qwis and Televideo Systems, Inc. 625s. The agency also uses Eastman Kodak Co. DRT-150 microfilm reader copiers and a variety of DEC and Data 100, Inc. printers. The terminals, linked by the communications lines to the New Jersey facility, draw information from a data base managed by a Software House Systems 1022 data base system on the Decsystem-10.

But even with the system in place and operating well, the agency still faces an occasional monkey wrench in the form of new legislation.



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## NEWS

## Direct marketing group assails IRS matching plan

### Direct mail lists to be used to locate tax evaders

By Paul Komerstovick  
CW Staff

The Internal Revenue Service's plan to use direct mail lists to locate tax evaders has drawn fire from the Direct Marketing Association (DMA), a coalition of 2,400 direct marketing companies.

"These lists are designed for marketing purposes and should not be used for law enforcement," said Jonah Gittitz, the DMA's senior vice-president.

The DMA fears that citizens will be afraid to release information that marketing personnel need in order to target prospective customers. "If the public thinks the IRS may use the information, they will be less likely to cooperate," Gittitz claimed in a recent interview.

By matching 1983 tax filer lists against a mailing list from Washington, D.C.-based Dunhill Co. that cost the IRS \$40,000, the IRS hopes to locate 1,200 tax evaders in each of four test locations: Milwaukee, Bronx, N.Y., Nevada and Indiana (CW, Sept. 1, 1983). Dunhill's list contains 2 million names equally divided among the four locations.

"The list provides information such as name, address, estimated household income, age of occupants, spouse and number of people in a household," said Wilson Phadely, public affairs officer at IRS. "Dunhill uses public information such as census track and real estate data to develop the list."

"These lists are used primarily for locating potential customers and may contain inaccurate information, according to Gittitz. "Direct marketing companies do not qualify the accuracy of each entry," Gittitz said. "These lists are used primarily for targeting prospective customers and for keeping a dossier on every citizen."

Dunhill was not the first company that the IRS approached, according to the DMA. "There were a number of direct marketing companies that were not willing to rent their list to the IRS," Gittitz said.

IRS Phadely said that Milwaukee will serve as the first test site, where the IRS is running the Dunhill list against the government's 1983 Milwaukee tax return list.

"Our system is National Advanced Systems, Inc. All/90601 is able to match lists easily," Phadely said. "Annually, we match tax returns against the previous year's returns. We have almost completed the computer matching between the Dunhill list and 1983 Milwaukee tax filers list. By April 1, we will

mail a list of prospective nonfilers to the Milwaukee office."

Potential nonfilers will be given the opportunity to respond to charges. "In May or June, the local IRS office will mail to [prospective] nonfilers a notice asking why

they did not file a tax return," Phadely said. "If they refuse to respond, their cases will be handled like other investigations."

Later this year, this process will be followed in other test sites. When the four test cases are completed, the IRS

plans to do a cost benefit analysis on the project. "We estimate that in 1981, there was \$2 billion in uncollected taxes," Phadely said. "We hope that techniques like computer matching will help us collect a portion of this money."

If the pilot program is not effective, the IRS must decide if it wants to implement the system nationally. DMA staunchly opposes such wide implementation. "Our members will not cooperate with the IRS' plans," Gittitz said.



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## NEWS

## Office automation not yet a widespread trend: survey

By Patricia Kaele  
CW Staff

BILLERICA, Mass. — There is plenty of room for growth in the office automation market, according to a nationwide survey sponsored by Honeywell, Inc., which found that more than half of the offices it surveyed do not have word processing power, and fewer than one in 10 managers use a personal computer.

In an age of automation, even those secretaries working in automated offices typically share equipment or send work to an automated center, according to "Office Automation and the Workplace."

The survey was conducted by Re-

sponse Analysis, a research firm located in Princeton, N.J. The results are based on a random sample of 443 information-intensive businesses with 100 or more employees. Specifically, 1,264 secretaries (98% female) and 937 managers (84% male) were questioned. One-third of the secretaries worked for three or more managers.

Only 5% of the secretaries surveyed have their own computer. Further, two-thirds of the offices surveyed did not have memory typewriters, and three-fourths or more did not have personal computers, electronic mail and computerized scheduling and filing.

However, in offices where automation has been introduced, secretaries depend upon their equipment. Forty-six percent reported that half or more of their daily work load is automated, more significantly, seven in 10 secretaries said it would be difficult or impossible to handle their work load without the equipment.

Although both managers and secretaries identified communications as the key to improving office productivity, bosses were more likely to say that more automated equipment would increase productivity, while twice as many secretaries cited the need for more of a team relationship, the report said.

The most frequent suggestion offered for improving productivity where automation already existed was more and better training. Secretaries in particular cited training as the single most important change needed when introducing automation into the work place.

The level of satisfaction with automated equipment was found to vary according to the level of automation, with users from companies with high and medium levels of automation expressing the most satisfaction. "Time in 10 say automated equipment makes their job easier, makes routine tasks go faster and improves work flow through the office," the report said.

Among managers, managers are more positive than secretaries about automated equipment, while younger secretaries were found to view automated equipment more favorably than their older peers. Also, a third of these managers estimate that half or more of the daily secretarial work load could be automated — an estimation borne out by 66% of secretarial users.

Overall, users and nonusers expressed few, if any, concerns about having automated equipment in their offices.

Copies of the survey are available free from Honeywell, 300 Concord Road, Billerica, Mass. 01821.

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CHICAGO — The successful implementation of factory automation systems will be the focus of the Factory Systems Summit Conference, which will be held here May 15-16 at the Knickerbocker Hotel by The Yankee Group.

The event will highlight strategies and tactical approaches to managing new factory technology, according to The Yankee Group. Recent developments in factory automation will be explored, and participants will be able to compare the strategies of companies that have already undertaken automation.

According to the sponsor, registrants will be asked to outline the issues most important to them, and speakers will address their topics from the perspective of those issues. Among the scheduled speakers are Larry Gould, research director of the Factory Systems Planning Service, who will provide an overview of current technology, and Richard Morley of Gould, Inc., who will outline the future of factory systems.

In addition, Howard Anderson, managing director of The Yankee Group, will discuss networking as it relates to industrial automation, and Frank Curtin of the General Electric Co. will speak on the vendor's role in manufacturing system planning and implementation.

Attendance for both days of the Factory Systems Summit Conference is priced at \$575.

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## NEWS

## Three unresolved issues identified for OA users

By Patricia Keesle  
CW Staff

CAMBRIDGE, Mass. — Users of office automation must face three critical, unresolved issues before they can expect to reap its rewards, according to a report by a Yale University professor based here. The issues are:

■ The tension between social roles and efficiency.

■ The "distracting" use of OA to relieve drudgery only.

■ The need to provide more avenues for employee participation.

In her report, "Office Automation and People: A New Dimension," Rosabeth Moss Kanter asserted that the challenge of office automation is twofold: to use time saved by the computer as a "hand tool" to work

on problem solving and innovation and to extend use of the computer as a "head tool" to enrich human minds and communication.

The report is a reaction to the findings of a Honeywell, Inc.-sponsored national survey on office automation. Kanter, who is a consultant to Honeywell, is both a professor of sociology and organization and management at Yale's School of Management and chairman of the board of Goodmeasure, Inc., an international management consulting firm located here.

According to Kanter, the ability to meet the challenge of OA is handicapped by traditional social roles and relationships in the office, particularly the relationship between managers and office workers. Mak-

ing the best use of OA will mean of-fice role changes, Kanter said.

### Counting clock

She warned of a coming clash between office workers desiring more responsibilities and managers who want to maintain current roles. The latter stance was described as a defensive reaction against any change in status or work methods that might arise from the potential of OA to create new roles for secretaries.

The first role change is likely to see younger, lesser paid employees (typically female secretaries) instructing older, better paid managers (typically male) in OA techniques.

What appears to be a status reversal will inhibit some managers from

learning about OA, Kanter predicted.

Kanter also advised using computers to help people not only do their jobs faster, but do them better by providing more brain power. "Whereas short-term productivity can be affected by purely mechanical systems, innovation requires intellectual effort," she said.

Noting that the Honeywell study uncovered a strong desire among secretarial workers for greater participation in decision making, Kanter warned that "bringing in major technical change is not simply a technical matter. Participation and collaboration [with workers] are essential to the success of innovation, particularly complex innovations like office automation."

## Winners in office of future will use OA as 'head tool': professor

CAMBRIDGE, Mass. — Winners in the office of the future, according to Rosabeth Moss Kanter, will be the corporations that employ of-fice automation as a "head tool" to enhance communication and innovation and are visionary enough to use it to reshape social roles in the of-fice toward more participation and teamwork.

Kanter, a Yale University professor of sociology and management, as well as a management consultant to Honeywell, Inc., offers the following steps as a method to help ensure successful of-fice automation:

■ Well in advance of system implementation, try out plans and ideas on people within the organization to ensure that all key stakeholder groups "buy in."

■ Form a steering committee to manage the entire effort and provide members of the group with special training in people-sensitive consulting.

■ Ensure the involvement of potential users and affected employees by soliciting suggestions and holding management briefings long before the equipment arrives. Use this input to help shape purchasing decisions.

■ At installation, encourage dialogue between users and vendors and ensure that the vendors are willing to modify their plans to accommodate the needs of a particu-

lar office.

■ Offer open-ended, people-oriented training that is self-paced, problem-centered and based on real-life problems.

■ Establish monthly user meetings on a permanent basis that provide encouragement and support, including personal and professional growth.

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## NEWS

## Tips offered for developing advanced office systems

### Informal survey urges MIS directors to broaden base of DP expertise

By Robert Ruff  
CM West Coast Bureau

Management information systems directors must broaden the base of traditional data processing expertise found in large, Fortune 1,000-type corporations when developing strategies for advanced office systems, a number of experts in the field stressed in a series of recent telephone interviews.

Philip James, vice-chairman of the Office Automation Council of Los Angeles, for example, said MIS directors must put in place an infrastructure of skills to enable the effective management of end-user computing through office systems.

"The skills required to implement technologies such as electronic mail, telecommunications, word processing and voice/data communications are not likely to be found in one person," James maintained. "MIS directors will need to draw upon the backroom data processing skills of their people and combine them with people who have front-room office skills and interpersonal skills," James added.

James, who is also director of strategic planning, corporate information resources, for Northrop Corp., the Los Angeles-based aerospace

manufacturer, said very few companies have yet put in place a formal training program to develop and blend such skills.

#### Broad-based skills

Jack Adams, a partner in the accounting firm of Price Waterhouse & Co., also emphasized the need for broad-based skills. "There are precious few people with the background in voice and data and sufficient business acumen to make a go of advanced office systems," he observed.

"Too often, the MIS director re-

cruits people with skills that are much too narrow and has attempted to launch an office automation program through these people. Usually it turns out to be a pretty sluggish launching," Adams said.

One company that has instituted a formal office systems strategy is Standard Oil Co. of California (SoCal). SoCal expects to have 1,000 personal computers installed worldwide by the end of the year.

In addition, the company has a network of some 2,500 IBM S/370 CMT terminals running under IBM's Systems Network Architecture (SNA),

and it has formed an advanced office systems group to install Xerox Corp. 800 word processing systems connected via three Ethernet local-area networks.

Charles Oldenberg, SoCal's general manager of computer services, said, "We are relying on in-house expertise. Our management philosophy is to keep people on a steep learning curve and emphasize team efforts in developing the data processing, telecommunications and user skills that we need."

According to Red Asher, a personnel officer, a person-

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## OA emergence in large firms to impact MIS

By Robert Ruff  
CM West Coast Bureau

The emergence of advanced office systems in large corporations will have an enormous impact on the way the management information systems department carries out its functions.

That was the consensus reached by data processing managers and industry consultants in a series of recent telephone interviews.

The development of office technology will lead to a fundamental change in the nature of many MIS programs and the way they interface with their companies as a whole, according to Steven Abraham, senior management consultant at Price Waterhouse & Co. in Los Angeles.

"The major issue facing MIS managers today as a result of office automation," Abraham said, "is how to turn their DP departments into the kind of end-user computing facilities that organizations now require. This is no small change, since DPs will help to determine the way information is going to be used throughout the whole organization."

John Connell, executive director of the Pasadena, Calif.-based Office Technology Research Group, contended that the changes prompted by office automation are vast and vary from company to company. If the impetus for OA systems comes from the MIS department, Connell said, the developments tend to be more technologically oriented than if another de-

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## NEWS

**OA** from page 25

partment, such as human resources or administration, were the prime mover behind the technology.

"In some cases, political warfare has arisen as different factions within an organization attempt to increase or maintain their power through the use of office systems," he observed.

Connell sees two major directions occurring concurrently in the development of office systems:

■ The focus of the traditional data center and its support activities on transaction processing.

■ The need to move the technology out and put computing capabilities in the hands of end users.

**Key different functions**

"The first is a service function, while the second is a facilitating problem. They are, therefore, two very different kinds of functions, and we may not be able to put them in the hands of one person," Connell said.

Abraham suggested one solution would be to hire a new information officer, unmarked by any history of internal political wrangling, who would be responsible for bringing the different elements of advanced information systems together, while leaving the MIS director to concentrate on managing the central DP resources.

"One way or the other, the MIS job is going to change drastically. The MIS director who is protective of his status and not willing to face the new requirements posed by office systems will end up as the loser, and his DP organization will fail in the process," Abraham warned. "The MIS director who makes the necessary adjustments will come out as a big winner."

According to Philip James, director of strategic planning, corporate information resources at Northrop Corp., many DP managers seem to be slower than other departmental managers to change their perspective in dealing with office automation. But James, who is also vice-chairman of the Office Automation Council of Los Angeles, said office systems is a dynamic field that is attracting a lot of dynamic people, and if MIS managers do not develop a greater end-user orientation, they will find themselves with big problems.

"The development of advanced office systems calls for an understanding, at a broad level, of the potentialities of information technologies, a close relationship with senior management and a set of political, technical, organizational and managerial skills to drive home the office of the future effectively," he concluded.

**OFFICE** from page 25

net recruiter in Los Angeles who specializes in office systems technology. MIS directors are using all possible avenues to lure office systems specialists into their camp, including such bait as extensive advertising, employment of recruitment agencies and outside consultants, internal training, increased bonuses for employee referrals, technology fairs and the tra-

ditional grapevine.

"Right now, the main experts in office automation are to be found among the OA vendors themselves, personal computer manufacturers and among the large end users who have pioneered the use of office technology," Asher said.

"Corporations will need to become very competitive if they are to lure these people away from their present jobs."

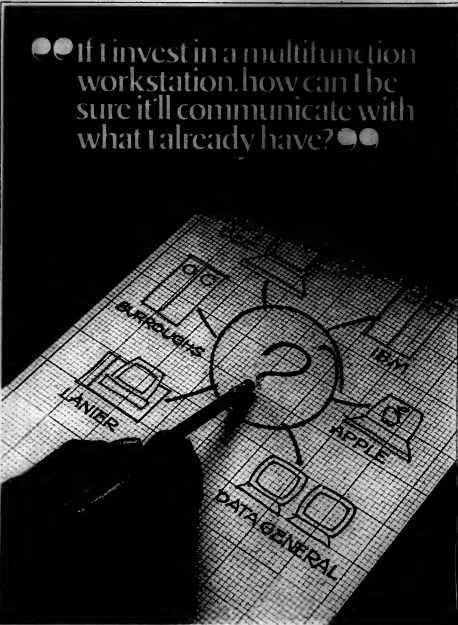
On the other hand, John Connell, executive director of the Office Technology Research Group in Pasadena, Calif., an international association of managers specializing in advanced office systems, contends that the frenzy over the lack of OA specialists is misplaced.

"Office technology is not 'difficult,' and there is no shortage of skills," Connell contended.

"The real need is for peo-

ple who can move the technology out to nonspecialists and make them comfortable with it.

"While someone in data processing or data communications needs to be concerned with tying the different systems into a network, the real skills are human interaction skills," Connell added. However, he said MIS directors are not well versed in developing those skills among their people.





## NEWS

## A look at software productivity: tell us your view

Computerworld's May Special Report will take a close look at software productivity, something our readers are continually trying to improve.

The Special Report will focus on application techniques and the efforts being made to reduce them; the programmer shortage and whether it

really exists; high-level languages and structured programming and code generators as well as reusable code.

Contributions to the Special Report can take one of two forms: a tutorial article discussing a productivity issue or trend or a user application story outlining a particular firm's experience

with a software package.

Articles must be typed, double-spaced and conformed to length from four to eight pages.

Artwork such as charts, graphs and photographs are encouraged.

Authors should also include with their articles a brief biography and a tele-

phone number at which they can be reached.

The deadline for submissions to the Special Report is March 28. If you have a tale to tell, address it and any questions to Donovan White, Special Reports Editor, Computerworld, 275 Coshatt Road, Box 890, Framingham, Mass. 01701.

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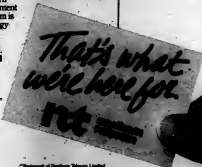
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## MANAGING ON THE EDGE

FRANK GRAU, director of management information systems for General Development Systems Corp., has been named assistant vice-president of management information systems. Grau will have overall responsibility for administration of the corporate information and word processing functions for the Miami-based company.

Grau was with General Development from 1974 to 1981 as manager of systems and programming in the MIS department and later as assistant vice-president of community operations.

From 1981 to 1983, he served as vice-president of marketing for Colonial Data Systems, Inc. and director of management information systems for Interterra, Inc. He rejoined General Development in June 1983 as director of management information systems.

Grau holds a bachelor's degree from the University of Jose Marti in Havana and also attended City College of New York.

JOSEPH L. BROWN has been elected assistant vice-president of systems and programming for Lincoln First Bank's new National Bank of Westchester division in White Plains, N.Y. Brown joined Lincoln First Bank in 1976 as an analyst in the systems and programming department.

In August 1979, Brown advanced to senior analyst and in March 1981, he was appointed systems officer. In October 1983, Brown was promoted to assistant vice-president.

Prior to his arrival at Lincoln First Bank, he served 10 years with Westchester/Rockland Newspapers, Inc.

DOUGLAS A. STEVENS has been named director of new systems development for the Grand Union Company in Paramus, N.Y.

Prior to joining Grand Union, Stevens was product manager of on-line directory systems and manager of overseas data processing for ITT in Secaucus, N.J.

He graduated from Miami University with a B.A. in economics and from Rutgers University with an MBA.



## NEWS

# Supercomputers aid understanding of solar activity

By David Gilman  
Of Staff

BOULDER, Colo. — Aided by a sophisticated \$35 million computer facility at the National Center for Atmospheric Research (NCAR), astronomers have developed the first solid evidence of a connection between the sun's speed of rotation and the 11-year sunspot cycle.

Peter A. Gilman of the research center's High Altitude Observatory here specializes in building highly complex numerical models of the sun, utilizing the center's two Cray Research, Inc. Cray-1/A supercomputers. His models were instrumental in establishing the correlation between sunspot activity and solar rotation.

A senior scientist and head of the observatory's solar variability section, Gilman worked on the project with Robert Howard, a prominent solar astronomer based at the Mt. Wilson observatory in Southern California. Pamela Gilman (no relation), a research assistant at the Mt. Wilson observatory's headquarters in Pasadena, Calif., also participated in the project.

Scientists have known that the sun is spinning rapidly, with the equatorial region making a complete rotation in about 27 days. The cycle of sunspots changes between minimum and maximum activity during an 11-year period. Gilman and Howard have discovered that the sun's rotation speeds up every 5 1/2 years, at both minimum and maximum sunspot activity — an occurrence they call the "twist-peak effect." During these periods, the speed of the sun varies by as much as 1%.

Howard said the finding "implies that some internal dynamic — some very large internal circulation — is going on, which is probably responsible for the sunspot cycle and which has an effect on the sun's rotation."

They had to an explanation.

"We don't understand what causes the activity cycle," Howard added, but "we do know it's magnetic in origin and that it takes place somewhere in the sun." However, the latest finding does provide a clue that may someday lead to an explanation of the sunspot cycle.

Gilman explained that his modeling has concentrated on understanding what is occurring in the sun's convection zone, a region that is believed to occupy roughly the outer one-third of the radius of the sun.

The center's two Cray-1As are front-ended by twin IBM 4341 mainframes. The center uses an Ampex Corp. Terabit Memory System (TMS-4) for mass storage. Two Decoded Corp. D-68C document microform systems are used for processing graphics data; they are controlled by a Digital Equipment Corp. PDP-11/84 minicomputer. Near staff members have interactive programming capa-

bilities provided by two DEC PDP-11/70 minicomputers.

Gilman's finding is based on an analysis of data collected from 53,000 photographic plates of the sun taken daily over the last 67 years with Mt. Wilson's solar tower. Gilman and his colleagues plan to conduct a similar analysis of another plate collection dating back to 1905 that was recently discovered in India.

Gilman has been involved for 10 years in building mathematical models of the global, dynamic properties of the sun, in particular, convection, differential rotation and the solar dynamo — the mechanism by

which magnetic fields are amplified and maintained. Before large, very fast computers were developed in the 1960s, Gilman said, it was impossible to explore systematically the theory of differential rotation and the solar cycle.

"These models do not have exactly the same physics in them that the sun does; in fact, they're considerably simpler," Gilman said. "Nevertheless, they are still very complicated and require enormous amounts of computer time." He said that performing just one large modeling calculation can require 50 hours of computing time on the Cray alone.

Supercomputers that can perform

massive number-crunching calculations are now "clearly indispensable" in his work, Gilman said.

The center's computing facility is one of the largest in the U.S. dedicated to scientific research and is the only one used solely for atmospheric science and solar physics, according to an NCAR spokesman. NCAR is operated by the University Center for Atmospheric Research under the sponsorship of the National Science Foundation.

Some 80 qualifying universities and research organizations in the U.S. and Canada are linked to the center's computing facility by remote terminals.

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## NEWS

# Upcoming electronic novels to let readers twist the plot

By Edward Warner  
CIV Staff

**SUNNYVALE, Calif.** — A woman is strolling on a beach. She spots a handsome man seated on the sand. Should she stop and talk with him? Go for a swim with him? Accompany him to the nearby bar?

Readers will get to make that decision — at their computers — in a diskette-based novel called *Island Love*, soon to be released by Home Computer Software, Inc. here.

*Island Love* is one of a series of interactive novels — stories where the reader decides the plot's twists — that are about to be unleashed on the reading public by several software

publishers. Simon & Schuster, Inc. has signed Robert Heinlein, author of *Stranger in a Strange Land*, and six other science fiction writers to script "Doppy books" for its Beam Software label, a series scheduled to debut in April. Synapse Software is said to be ready to release seven electronic novels this spring which, unlike the Home Computer Software products, will reportedly not require users to interact at all if they choose not to.

It is Home Computer Software, though, that is going for the widest-ranging market, from adventure stories to mysteries, historical novels and science fiction. For the readers of romance fiction, the company will

publish both teenage and adult interactive novels, said Bob Katz, Home Computer Software's marketing and sales vice-president. But, he noted, the adult romance, *Island Love*, will have no steamy beach scenes in its range of plot options.

"They're not going to get too racy; we're going after the mass market," Katz said.

The company will also market a story called *What if Lincoln Had Lived?* that will give users a chance to affect events in the Reconstruction-era South. Another, called *Your Championship Season*, makes the reader a team coach, complete with a player who has a drug problem.

"That's real life, you know," Katz pointed out.

Katz said the stories, some of which have as many as 50 possible endings, will encourage reader creativity. The stories will include graphics and eventually will include electronic "bookends" that allow readers to shut off their novels, then turn them on again and instantly pick up where they left off.

Between 30 and 40 authors, including many teachers, are writing for the series, Katz said, adding that none have balked at turning over creative decision making to their readers. "They love it," he said. "This gives the writer the option to develop all those endings."

The Home Computer Software "Stories Alive" series will be delivered to retail book and computer stores in about 90 days, Katz said, and novels in the line will average in cost from \$19.95 to \$29.95, with none over \$39.95. They will run on the Apple Computer, Inc. Apple II, Commodore International Ltd.'s Commodore 64 and the IBM PCjr.

Synapse Software will provide its electronic novels in July at an average price of \$40, according to a spokesman. They will run on all Warner Communications, Inc. Atari computers, the Apple II series and the IBM Personal Computer and PCjr.

Simon & Schuster's Beam Software will reportedly carry an average retail price of \$25 to \$35 and will be available for the Apple II and IIe computers, the PCjr, Atari 400 and 800 models and the Commodore 64.

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## Martin seminar to open April 2

**SANTA MONICA, Calif.** — The Spring 1984 James Martin seminar, a four-city, five-day seminar on "The New DP Revolution," will be held first April 2-6 at the Marriott Crystal Gateway in Washington, D.C.

Sponsored by the Technology Transfer Institute, the seminar is geared toward general managers, DP managers, systems analysts and designers, programmers, data base staff, teleprocessing and networking specialists, planners, end users and business people.

Some of the topics included in the seminar include "The Information Center," "Information Engineering," "Fourth-Generation Languages," "User-Driven Computing," "Automation of Data Base Design," "Superintelligent Networks," "IBM's Architecture for Future Office Automation," "Techniques Analysis," "Automated Application Generation," "Electronic Office Integration," and "An Information Systems Manifesto."

The seminar will also be given April 9-13 at the Hyatt on Union Square in San Francisco; April 23-27 at Chicago's Hyatt Regency; and April 30-May 4 at the Hyatt Regency in Cambridge, Mass. The registration fee is \$1,495.

Further information is available from the Technology Transfer Institute, 741 10th St., Santa Monica, Calif. 90402.

## NEWS

## Capacity management conference set

Author of 'Megatrends' to keynote April 9-12 event

WASHINGTON, D.C. — John Naisbitt, the author of the best-selling book "Megatrends," will be a keynote speaker at the sixth annual International Conference on Computer Capacity Management here April 9-12. Titled "Information Engineering — The New Frontier," the conference will examine the changing role of information management over the next 30 years.

Other keynote speakers will be William Symcott, senior vice-president of the Bank of Boston and author of "Information Resource Management," and Frank Reeder of the

U.S. Office of Management and Budget's Information Policy Branch, according to the show management.

The president of Boole & Babbage, Inc., Jack Van Kinsbergen, and the originator of "Murphy's Law," Edward Murphy Jr., will also speak, according to the conference management.

Topics to be addressed at the conference will include the banking industry's approach to information engineering, successful information management, decision support systems, information as the asset of the 1990s and new computer architec-

tures, according to meet sponsors.

The conference is sponsored by the Institute for Information Management and will be held at the Capitol Hilton.

Conference registration fees are \$395 for IBM clients and \$495 for nonclients. The conference's day-long tutorials are \$195 each, and one-day conference attendance is \$195, according to the show management.

Further details are available from the Institute for Information Management, which is located at 100 Oakmead Pkwy., Sunnyvale, Calif. 94086.

## Cincom forum to target MRPS users

CINCINNATI — Cincom Systems, Inc. has announced that its second annual North American MRPS User Conference will be held April 1-4 at the Marriott Inn here.

Cincom's MRPS is a production and inventory control software package that operates on IBM mainframes and the Digital Equipment Corp. VAX-11 series of superminicomputers, according to a Cincom spokesman.

Conference activities will include user presentations on particular MRPS applications and discussions led by the Cincom staff about product and strategic plans, a Cincom spokesman said.

The conference registration fee is \$250 for the first representative of a company and \$150 for each additional person.

More information is available from Cincom Systems, Inc., located at 2500 Montana Ave., Cincinnati, Ohio 45211.

## AMS '84 meet slated for June 12

CHICAGO — "The Computer: Mind of the Factory of the Future," will be the theme of the Advanced Manufacturing Systems Exposition and Conference (AMS '84), scheduled for June 12-14 at McCormick Place here.

The show and conference, sponsored by Clapp and Polak (a Cahners Exposition Group), will feature demonstrations of information systems and automated production systems directed to the needs of manufacturing companies.

More than 50 sessions are reportedly scheduled focusing on areas such as productivity improvement systems, planning for closed-loop systems, advanced manufacturing systems technology and material control systems.

Information-related exhibits are expected to include computer-aided design and manufacturing systems, computer accessories and peripherals, various-size computers, duplicating systems, data collection and communications systems, distribution systems and software for manufacturing, according to show management.

Production-related sessions are scheduled to include robots and robotics, automated inspection equipment, programmable controllers, flexible manufacturing systems, optical measurement systems and laser equipment.

The price for the three-day conference is \$295. One-day conferences are priced at \$160 and half-day conferences at \$85, according to the show management.

More information is available by writing AMS '84, 705 Third Ave., New York, N.Y. 10017.



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## NEWS



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## BRAZIL

**RIO DE JANEIRO** — A software product developed at the State University of Rio De Janeiro features a special man-to-machine interface that is said to reduce application development time significantly. The software is called Gm, and its interface reportedly prompts the user by talking him through the development process with voice commands, a University spokesman said.

**RIO DE JANEIRO** — Brazil's Special Department of Informatics has two months left to establish a firm policy for the medium-size computer systems market, which traditionally has been reserved exclusively for Brazilian companies. The computer manufacturing projects that are most often granted government approval have come from Brazilian companies that rely on their own technology or on IBM-compatible foreign technology. Four conflicting legislative proposals for a national computer policy (Informatics Law) are currently under debate and are mobilizing all political factions. The proposal of Democratic Party representative Cristina Tavaras calling for strict market reservation is favored by the Brazilian business community, while it is also considered to be the most radical,

sources reported.

**RIO DE JANEIRO** — While other sectors of the Brazilian economy found themselves deep in the throes of depression, the information processing industry continued to show exceptional growth in 1983, according to a recent report from the Association of the Brazilian Computers and Peripherals Industry (Abcomp). The report cited computer industry sales last year of \$450 million, with personal computers and financial terminals showing the highest growth margin. The report also claimed some 16,000 jobs were created last year by the indigenous computer industry.

## FRANCE

**PARIS** — An additional operating system plus three dual processors for its DPS 7 range of systems were unveiled here last week by Bull, the French computer conglomerate formerly known as CII-Honeywell Bull. The Gcos 7 operating system reportedly features some 20 software programs and languages for users with and without computer expertise. The operating system will run on all members of the DPS 7 family and is compatible with its predecessor, Gcos 64, according to Bull.

Falling in the medium to high end of the company's product line, the three dual processors — DPS 7/60P-Dual, DPS 7/70-Dual and DPS 7/80-Dual — feature increased memory capacity to 8M, 12M and 16M bytes, respectively. Pricing on this series

begins at approximately \$1 million for a 4M-byte DPS 7/60P-Dual with two 1,200 line/min printers, two 6,250 bit/in. tape drives and a front-end processor capable of managing up to 14 communications lines.

## JAPAN

**TOKYO** — AT&T Japan, in conjunction with Tokyo University, is in the process of creating a standard for a Japanese Unix operating system that would support Kanji characters. Toshiba Corp., the original maker of Japanese Unix, is making plans to keep pace with AT&T. According to sources, a standard for Japanese Unix is needed badly because several different and incompatible Japanese versions of Unix by various Japanese

vendors have sprouted up around the country.

**TOKYO** — The Ministry of Finance recently granted permission to credit companies to communicate with banks' computers. Credit-card holders will be able to use cash dispensers or automatic teller machines of the affiliate banks as of April 2.

## WEST GERMANY

**BONN** — The German federal government has earmarked over \$1 billion for technological research in microelectronics, information processing and communications over the next four years. The program is intended to bring new technologies to a practical level of use here.

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IBM PC/XT 2.11	YES	NO
Graphics Display	YES	YES
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Quiet Operation	YES (NO FAN)	NO	YES	256K
Memory	256K	256K (OPTIONAL)	256K	256K
Graphics Display	YES	OPTIONAL	YES	OPTIONAL
Full 2.11 (IBM)	YES	OPTIONAL	YES	OPTIONAL
Printer Port	YES	OPTIONAL	YES	OPTIONAL
Communication Port	YES	OPTIONAL	YES	OPTIONAL
IBM PC/XT 2.11	YES	OPTIONAL	YES	OPTIONAL
Optional System Price	2295	2495	2295	2495

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## NEWS

## Info center package links firm's diversified services

**PHOENIX** — The choices available when assembling an information center come down to two: Select from a diverse range of tools, or go with a tailored package. Talley Industries, Inc. here chooses the latter, with considerable success, according to company officials.

Talley and its 16 diversified operating companies generate \$300 million in annual sales. The company's commercial group manufactures clocks and timing instrumentation under the trade name Westlock and Seth Thomas. The government and technical segment is in the business of aerospace engineering and manufacturing products. A third segment consists of companies producing apparel and soft goods for major retailers. Talley's fourth segment is its realty group, involved largely in the development of industrial properties.

Executive management at Talley continually confronts the problem of improving parent company performance by analyzing the performance of subsidiary companies. But each subsidiary has a fairly high level of autonomy, which has opened up compatibility among Talley's DP reporting systems, according to Rodney D. Palmer, manager of financial analysis and reporting.

Talley requests that each company provide the headquarters office with a financial data sheet every 30 days. "Without computer help, we found we simply could not handle that periodic outpouring of data," Palmer said. "Trying to furnish our executives with meaningful summaries and special statistics within any reasonable length of time had become virtually unattainable."

Talley chose remote on-line services offered by Xerox Computer Ser-

vices, Inc. of Los Angeles. "Xerox offers a wide range of business management programs, with integrated packages available for manufacturers, distributors and public service agencies," Palmer said. "And the Xerox customer has a choice of on-line services, licensing Xerox software or a turnkey hardware/software installation on user premises."

### Mixed approach

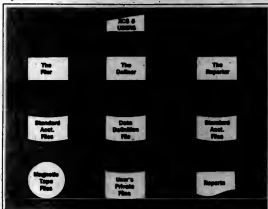
Talley went with a mixed approach, choosing the general ledger and accounts payable applications and accessing them via two Xerox terminals in the Phoenix offices and contracting for Xerox's package of information center tools. These consisted of software for creating special reports not normally produced by the application programs.

The information center package includes Xerox's Reporter report writer, Definer definition package, Filer file creation and manipulation system and Control decision support system.

Every 30 days, each operating company provides its financial data sheet covering pre-specified items. They include a summary profit-and-loss statement, balance sheet, depreciation taken, capital expenditures, capital expenditure commitments, various inventory levels including finished goods, income tax information and other administrative items.

"Using the two terminals in our office, we transmit the information to the Los Angeles data center. Then, from those updated files, we create four categories of reports most useful to our executive management," Palmer said. The reports are:

- Consolidated profit-and-loss statements.



The information center software offered by Xerox Computer Services includes these management tools, plus a decision support system called Control.

- Consolidated financial statements.

■ Operating highlights for each company, with comparisons of actuals vs. budgets for current month and year and against the prior four years.

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ceivable levels, inventory turns, day sales in receivables and so on. It also presents a graphics picture of the stockholders' investment in each company vs. the return on that investment.

Talley also uses Xerox information center tools to develop subapplications for functions unique to the business. "For example, if we wanted to establish a warranty tracking system, we would use the Filer program

See TALLEY page 38

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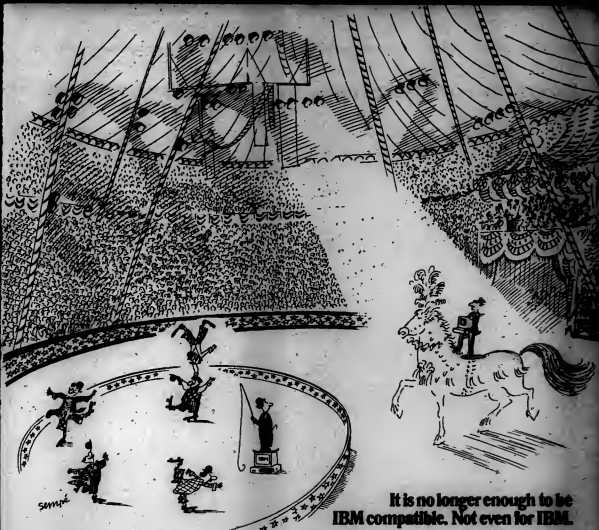
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## NEWS

## Course to cover local nets

WYCKOFF, N.J. — "Local-Area Networks" will be the focus of a two-day course being co-presented by Dr. Ira Cotten and Dr. Marshall Abrams next month. The course will be offered April 11-12 at the Fairmont Hotel in Denver and April 24-25 at the Marriott Hotel in Orlando, Fla.

The course will address such topics as current governmental and corporate experiences with local-area networks, the major considerations in implementing them and their selection criteria, among other topics. The key local-area network interfaces and communications protocols will also be discussed.

Cotton, who is with Booz, Allen &

Hamilton, Inc., was formerly the manager of local-area networks and office systems at the National Bureau of Standards (NBS). Abrams, with Mitre Corp., is a former NBS employee whose work centered on network quality and performance measurement and evaluation.

The registration fee is \$600, which includes meeting materials, lunches and a cocktail reception. A discount of 15% is available for three or more employees who register as a group. Additional information is available from the Special Projects Conference Management Center, c/o Information Breakthroughs, Inc., 445 W. Main St., Wyckoff, N.J. 07481.

## Multinational telecommunications seminar scheduled for April 11

WASHINGTON, D.C. — A seminar to help multinational corporations best use their telecommunications facilities in the face of foreign postal, telephone and telegraph regulations and data flow barriers will be held here April 11.

The seminar, titled "Optimizing Multinational Business Telecommunications," will feature Congressman Michael Oxley (R-Ohio) of the House telecommunications subcommittee as a speaker, a conference spokesman said.

Other speakers will include Herbert E. Marks, a Washington attorney

specializing in telecommunications law, and Richard G. Mills, a consultant on business telecommunications strategy development.

Also speaking will be G. Russell Pipe, editorial director of Transnational Data Reporting Service.

The seminar is sponsored by Transnational Data Reporting Service, Inc.

Registration for the seminar is \$65, according to the conference spokesman.

More information about conference registration is available from Transnational Data Reporting Service through P.O. Box 2039, Springfield, Va. 22152.

## Electro/'84 set for May 15-17

BOSTON — An estimated 45,000 engineers and managers in fields from data processing to microelectronics are expected to attend the Electro/'84 conference here May 15-17.

Sponsored by the Institute of Electrical and Electronics Engineers (IEEE) and the Electronic Representatives Association, the conference will focus on active and passive electronic components, fiber optics, instrumentation and production and packaging, among other topics.

The estimated 600 exhibitors will be divided between Hyatt Auditorium, which will house displays of computer hardware, peripheral assemblies, computer graphics and software; and the BaySide Exposition Center, the site of the Electro Professional Program. Exhibitors will reportedly include Data General Corp., Raytheon Data Systems Co., GTE Corp., Mitre Corp. and others.

Registration for the conference is \$10 at the door for IEEE members and \$20 for nonmembers. Preregistration for the conference is \$5, a discount received via a coupon available by writing the sponsor. Further information is available from Electro/'84, P.O. Box 92275, Worldway Postal Center, Los Angeles, Calif. 90009.

## TALLEY from page 36

to build a new data file based either on new inputs or on extractions from an existing file. And we'd use Report-er to design the desired report," Palmer said.

Definer allows users to define the contents and formats of special files, of records within those files and of fields within those records, Palmer said. "It lets us list the definitions for those files all without knowing anything about bits or bytes," he said.

Control uses an English language dialog and offers a library of 17 report formats and a custom-designed report facility, Palmer said. "But the major distinguishing features of Control are its capabilities to construct and exercise business and financial models," he said. "It lets us do all sorts of planning and analytical tasks."

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## NEWS

## Manufacturer fine tunes planning with MRP system

ONEHLIN, Ohio — After outgrowing a software system developed in-house and struggling for two years with a packaged system that created more confusion than it resolved, Gilford Instrument Laboratories, Inc. needed a new manufacturing resources planning (MRP) system.

Gilford, a subsidiary of Corning Glass Works, manufactures research and clinical instrumentation needed to identify biochemical examples. It has built an international reputation on the precision of its instruments. Unfortunately, in planning and controlling its production line, that same sense of precision was missing.

The company first implemented an MRP package when it became apparent that it needed a more versatile system than the one Gilford's own staff had developed in-house. Gilford operated with the package for two years, but planners felt they never really got the capabilities they needed. Inventory levels continued to rise, visibility to the shop floor was poor and work scheduling remained tied to "hot lists."

"Everybody dreaded the end of the month," recalled Dave Morrison, Gilford's production control manager. "Even though we had this formal system in place, there was no discipline in using it. We were still running the shop by an informal system out of little black books kept in shirt pockets. Every month closed with a rush to fulfill shipping quotas."

### Inventory items

Gilford needed a system that could keep track of its more than 17,000 inventory items and schedule and track the 1,500 assemblies that pass through the production line.

After management reviewed several MRP packages, Gilford chose Management Science America, Inc.'s (MSA) Manufacturing System software.

Having been involved in MRP implementations in the past, Morrison was chosen as project leader for the implementation of the MSA package as Gilford's new IBM 4300 series mainframe.

Gilford had chosen the IBM hardware in order to be compatible with the 4300 series equipment at Corning's Medfield, Mass., facility, which serves as headquarters for the corporation's Medical Products Division. MSA's Manufacturing System had also been successfully implemented at several other Corning facilities, Morrison said.

"What impressed us was the MSA Master Production

Scheduling module," said James Sutorus, director of management information systems at Gilford. "Our old system was very crude. There was no time-phased schedule, and it wasn't sophisticated enough to tell the supervisors on the shop floor what they needed. They couldn't see what was coming at them down the road."

"We established a very aggressive schedule for full implementation of the MSA package," Sutorus continued. "We decided we were going to put six modules up and have them ready for operation within three months. In December 1983, we received shipment of the software,

and by the last day of the year, we had the test data base up and running. In the middle of March we went live, and we've been relying completely on the package since then."

With the MSA system, according to Sutorus, all manufacturing orders to be released to the floor are

time-phased, giving management the control it needs in determining when changes in the schedule are no longer cost-effective. Material planners also gained visibility into what was happening on the shop floor. Through shop order status, they can now "see" how an order is actually moving through the plant.

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## NEWS

## Firm's DSS consolidates data from five subsidiaries

For developing corporate plan dealing with different business levels

**STAMFORD Conn.** — An energy, cement, iron and coal conglomerate here found itself faced with a problem in 1980 when it began developing corporate plans.

It had to consolidate information from five subsidiaries to come up with a five-year

corporate plan, a two-year profit plan for individual products, annual reports for each subsidiary and the parent company and quarterly forecasts that tracked performance against the two-year plan.

"At each level of the busi-

ness, we were dealing with different processes: several time-sharing services, and manual procedures," replied Andrew Langdale, director of MIS at Moore McCormack Resources, Inc. "Subsidiary planning often would be done manually and figures would

then be entered again for the corporate planning model. We were running up significant time-sharing charges, and there were inconsistencies in the models used by the different subsidiaries."

These problems clarified the need for a single, in-

house decision support system (DSS). Subsidiary and parent company personnel identified 124 individual models and plans, 100 of which were used or needed. These specifications were sent to 10 DSS vendors, who responded by indicating features their products offered.

Vendors were then asked to demonstrate their products to corporate users. The user group compared the software packages' ease of use, capabilities and price. The MIS department analyzed the compatibility of the products with its own IBM 3081 and two 4800 series mainframes running in the MVS operating environment.

At the end of the study, Moore McCormack Resources selected PCB-EPS from IBM, Inc. of Watsons, N.H. Initially, long-range profit planning and forecasting systems were developed. Applications for departmental budgeting, subsidiary operational planning, economic forecasting and pension plan analysis followed.

### Significant savings

"At last, we had a single DSS with a group of 34 to 50 people trained in its use and a variety of well-developed, stable models," Langdale said. "We experienced significant savings over external time-sharing — over \$100,000 and probably closer to \$150,000 a year. But just as we became comfortable with the product, it came the micro."

As IBM Personal Computers invaded Moore McCormack, MIS had to revise its strategy. Moore McCormack added a help desk, which aids users by testing new products, introducing new software, solving problems and providing DSS support. Approved forecasting software used by the company includes PCB-EPS for solving large problems on the mainframe, EPS Micro-PCB for complex financial problem solving and Lotus Development Corp.'s Lotus 1-2-3 for most problem solving needs.

"Most users' requirements are filled by Lotus," Langdale said, "but there are a number of functions and capabilities that run on the mainframe which just can't be completed on a microcomputer. For complicated forecasts, a user will use PCB."

Langdale said the advantages of the current strategy are common tools, trained users at all locations and lower costs. "By incorporating Lotus 1-2-3 and Micro-PCB together, our former nucleus of 34 hard-core decision support users has expanded to 75 to 100 people."

The new rack-mounted IBM 3868 Modem saves you space. And money. And effort.

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**NEWS**

## Info management system tames firm's paperwork

**TORRANCE, Calif.** — Just as an elaborately detailed pattern is woven into a fabric, so must the design of an information resource management system be interwoven throughout a corporation's day-to-day business operation.

While that may sound poetic, the parallels are quite evident at S. Harris & Co. here, the oldest fabric and wall-covering distributor in the West. In early 1980, Harris decided it had two options: either pull back and economize its operations or else take an aggressive stance and position itself for the post-recession period. It opted to go the latter route in order to stay competitive.

The manual inventory and accounting systems of the 77-year-old firm were unable to support the company's daily business objectives.

"We knew we had a problem when it started taking us three days out of every month just to age our receivables," recalled Bill Crawford, Harris' executive vice-president, noting that, while overtime became "a fact of life," Harris was still swamped with paperwork.

This spurred Harris to retain the consulting services of Michael E. Wood, president of Helix Corp., to plan and design an automated information system for Harris using the corporation's Helix Methodology. Key to this methodology is Helix's approach to the selection and implementation of automated information systems, which incorporates the disciplines of management, behavioral science and organizational and systems theory, according to Wood.

"We selected the Helix Methodology because it is the only approach that integrates such dynamic [humanistic] planning techniques into the development process," Crawford said.

Helix's first step was to find out the impact that new information systems would have on the company and its employees. Harris employees, from clerical on up to top management, all gave their input on how they thought the systems could work best in their particular departments, detailing the changes they wanted to see included in the new systems. Once it became clear to the employees that they would be playing an active role in the system's design, their anxiety and fear slowly disappeared.

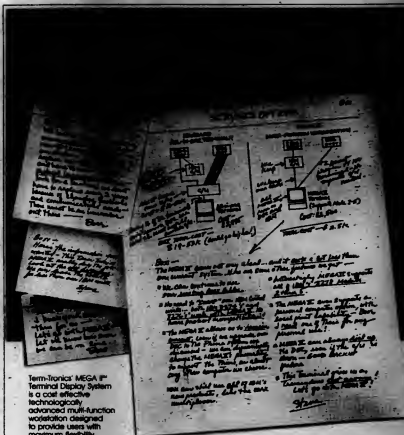
As a result of user involvement, Harris was able to identify the major goals necessary to support the corporate objective of same-day shipments of 96% of all orders. The goals included the ability to update inventory files to reflect immediately the impact of a customer's order; to retrieve a customer's order during a two- to three-minute telephone inquiry; to produce a variety of sales reports based on pattern, color and yards sold; to monitor sales by salesman and territory; to check all sales and purchasing activity; and to assist given salesmen; and to provide a daily stock alert report and a back-order report that would assist in the reordering function.

Next, Helix selected several vendors for Harris' consideration. Interactive, Inc., a software writer and turnkey vendor, was chosen because

Harris felt it was the most flexible and mature of the bidders. Interactive chose Ultimate Corp.'s Ultimate operating system, which is based on Pick Associates, Inc.'s Pick operating system, to run on a Honeywell, Inc. Level 6 minicomputer, using Interactive's proprietary application software.

In July 1983, Harris installed 21 Volkar-Craig, Inc. CRT terminals, a 600 line/min Printronix, Inc. printer and two 125 char./sec Texas Instruments, Inc. printers. The interactive

Merits executive response system from GBT



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## NEWS

# TI researcher to get IEEE award at Compcon Fall '84

SILVER SPRING, Md. — Harvey Cragan, senior fellow in computer research at Texas Instruments, Inc. will receive the National E. F. Farnsworth Award of the Computer Society of the Institute of Electrical and Electronics Engineers, Inc. (IEEE) at the organization's Compcon Fall '84 conference, which will be

held Sept. 16-20.

Cragan will receive the award for his "creative contribution and leadership in using computer architecture with inherent capabilities of integrated circuits," according to an IEEE representative.

Cragan worked on the first integrated circuit com-

puter, delivered to the Air Force in 1961, and was a major contributor on the TI Advanced Scientific Computer, according to Prof. M. D. Corfield, a member of the committee that chose Cragan for the award.

The award, established in 1970 through an agreement between IEEE and the IEEE

Foundation, Inc., consists of a bronze medal, a certificate, \$2,000 and a \$2,500 international travel grant.

Compcon Fall '84 will be held at the Hyatt Regency Crystal City Hotel in Arlington, Va. Its theme is the "Small Computer (R)evolution."

The registration fee is

\$125 for members and \$150 for nonmembers.

The conference registration deadline is Sept. 2, after which conference registration costs will rise approximately 5%.

Registration can be made through Compcon Fall '84, P.O. Box 636, Silver Spring, Md. 20901.

## HARRIS

software has a response time of less than one second for 90% of those entries.

Training was minimal because of user involvement and hands-on experience during the planning phase. Harris even felt confident enough not to install a DP department.

"We trained one of our own people to be our troubleshooter," Crawford explained. "With no prior computer experience, she now handles about 80% of the equipment-related problems that arise." Interactive takes the other 20%.

The company decided not to maintain its old manual system on a parallel basis while implementing the new system. The firm felt its employees would learn, accept and use the new system faster if they didn't have the old one to rely on.

Also, running two systems at the same time was cost-prohibitive. Because of the planning, it took only three days to transfer the entire 25,000-item inventory onto the new system.

Before the changeover, there was an eight- to 48-hour gap from the time an order was taken to the time inventory was updated. The company has now reached its goal of 95% same-day shipment service, and Harris is now able to handle three times the volume of orders with less manpower. Over time is a thing of the past — through attrition, Harris has been able to cut its work force without overburdening those who remain.

"We expect to save over \$25,000 this year in overtime expenses alone," Crawford said.

Harris believes the key reason its information resource management system is running so successfully is the company's ability to plan for any potential future data base requirements properly. "You have to think in terms of broad goals when planning for a new information system," Crawford said. "We are now at the threshold of reaching many of our goals. The planning and preparation took a relatively short period of time. When you see the results of proper planning, you realize it's the only way to go."

Most companies experience the same thing when they start tying remote terminals to their minicomputer.

Much higher phone bills. But now there's an inexpensive solution to that costly problem: The new Codex 6002 Intelligent Network Processor.

This low-cost multiplexer will save you money even if you're using as few as two terminals. The 6002 boosts operating efficiency, reduces the number of needed lines and protects data from errors due to line disturbances. And it can handle any mix of up to 16 asynchronous terminals, including graphics terminals, word processors and personal computers from virtually any manufacturer.

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## Automated office helps firm customize client data

CHICAGO — Conversion to an automated office meant that people "who had never seen a computer before" increased productivity and made higher quality reports and presentations to clients of SEI Corp.'s Funds Evaluation Division.

The division was formed in 1955 as the nation's first organization to provide performance evaluation and consulting services to corporate pension plan sponsors and institutional money managers. But to do so, a 1980 internal study found, client representatives spent a considerable amount of time manually customizing information for clients in the form of text, graphs, tabular data and special studies.

The Funds Evaluation Division has 350 employees handling 1,600 clients. To improve productivity, it launched plans to develop an automated office, vice-president for Product Design Mirilla Shannon said.

At that time, the parent company of the division was A.G. Becker Faribair, Inc. Becker completed a separate automation research project and recommended selection of Wang Laboratories, Inc. word processing systems.

The division installed a Wang Office Information System (OIS) 140 Model I — later upgraded to a Model III — in its Chicago office. It also installed an OIS 150-A in New York, OIS 115-2a in San Francisco, Los Angeles, Atlanta and Toronto and Wangwriters in Boston and Philadelphia.

In the first phase of implementation, personnel were trained and existing operations automated over a 12-month transition period. In the second phase, the computing, programming and telecommunications capabilities of the system were implemented. The systems were used to calculate internal and time-weighted rates previously determined by using desk calculators. Basic programming was used to develop prototype fund performance measurements, such as attribution analyses.

Also, a computerized data base containing information on more than 300 fund managers was developed for use in searches.

The systems are capable of communicating with each other and are equipped with IBM 2780/2790 and 3270 protocols for batch and on-line communication with IBM 3081 and Amdahl Corp. 470V/8 mainframes in Becker's data center, which SEI uses as a service bureau. Multifunctional Wang 5536-4 workstations are used as IBM 3270 terminals.

The division designed an interface between the OIS

systems and a Xerox Corp. 8700 laser printer in the data center. The interface capability and a Wang list-processing capability are used to send quarterly seven-page letters to clients, providing summaries of fund performance.

The final phase of implementation involved develop-

ment of a new client reporting system.

Although report production had been automated and accelerated in earlier phases, the documents were still providing only summary data. That meant that representatives were spending time analyzing and interpreting data and preparing additional re-

ports and letters for clients.

Therefore, the division developed a mainframe program to prepare quarterly textual analysis of individual fund performance data automatically in the form of letters 30 pages or more in length.

The program composes the letters, which are cus-

tomized and have the expertise for infinite variations, based on fund performance data," Shannon said. "The key result is an executive summary that provides more thorough, accurate, up-to-date and standardized information in the form of both written analyses and detailed graphics."

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## NEWS

# Dasd tool cuts retailer's need for additional storage

KANSAS CITY, Kan. — Montgomery Ward and Co.'s data center here, one of four across the country, discovered it could do without an additional mass storage system after obtaining a data set residency management system that automated the management and contents of its direct access storage devices (DASD).

The center operates IBM 3083 and 370/168 systems, running under the MVS JES3 operating system. On-line storage is provided with 48 IBM 3860 Winchester drives and 12 IBM 3330 Model 11 rigid disk drives, which are hooked to a 3860 B2 mass storage system.

Before obtaining a new Dasd management system, center personnel "had to clear the pack on a data set level using the IBM utilities, or dump the whole pack onto tape and restore [it] to another disk drive," according to Bob Dwyer, systems software specialist. "To do that, we needed a free pack to restore it. With DMS/OS, it is a much faster, much cleaner method, and I don't have to have a spare pack sitting out there just spinning and doing nothing."

About 14 years ago, the center obtained Sterling Software Marketing's data set residency management system (DMS/OS), which Dwyer said has performed better than expected.

## System order canceled

He first learned of DMS/OS at a Sterling seminar, and after he discussed the product with Montgomery Ward's corporate DP cadre, the company decided to evaluate the product. An IBM 3860 B2 mass storage system had been on order, but he subsequently recommended that the order be canceled, and the center has "gained back" two disk packs formerly committed to restoring.

He continued, "One of the most helpful capabilities of DMS/OS is that you can clear a pack quickly in a critical situation. When you have a pack out there that is taking some temporary hits, for example permanent read errors, and you want to get off that spindle so your customer engineer can work with it, it is just super to be able to hit the pack with the Vsam support, move the Vsam, hit the pack with the Volume Configurator and move everything else to a string of packs."

"It's very quick. You don't have to sweat, and DMS/OS has taken care of the cataloging for you," he added.

Much of the regained space, according to Dwyer, was attributed to the Vsam Support feature of DMS/OS. "The big thing is being able

to move Vsam around and get rid of some of my sub-allocated space and create the data sets as unique. I then know exactly what I have out there so I don't have to come up with a figure arbitrarily on how much space I'm going to need in the sub-allocated space to put my data sets in. Now, I can treat it almost like

a sequential data set because I can look at my maps and see how much space a data set is taking up instead of going through the Ickcase listing and looking at the relative byte address, which is really a very slow method of figuring out how much I am using.

"I can't say enough about DMS/OS' ability to move

Vsam data sets. . . . IBM's Report method was very slow and was done cautiously."

Dwyer was also pleased with the new System Productivity Facility (SPF)/Mass Selectable Unit of DMS/OS.

"I moved a lot of Vsam with the SPF option, which meant that I could sit right here in my chair and still get

the job done.

"Without SPF, it would be a little tougher because you are dealing with building control cards," he said. "DMS/OS' method of building control cards is simple, but the SPF option takes the guesswork out of it. You get the TSO/SPF panel screen,

See DMS/OS page 50



## NEWS

## Time short for public schools' system implementation

CLEVELAND — The Cleveland public school system didn't have much time to learn the best method of implementing a new computer system. "The school department decided last April to install a new system using IBM Personal Computers in each school. The scheduling and attendance applications had to be working when school opened in the fall," said Roberta Settles, administrative assistant for automation for the Cleveland public schools.

Previously, Cleveland schools used a system dependent on the city's IBM 3035 miniframe. "They wanted a decentralized system so each school could control its own attendance and grading," Settles said. "Administrators often had to wait for reports to be produced."

Pentastation Enterprises, Inc., in Bethlehem, Pa., was awarded a \$1.7 million, three-year contract to tailor each school's scheduling, attendance and grading applications. "When we designed the system, it had to meet Cleveland public schools' needs," said Daniel Knerr, divisional manager for Pentastation. "Each school district has a distinct way of completing its daily attendance, scheduling and grading. We were up very tight deadlines."

### New expectations for Pentastation

Pentastation's software is used by approximately 300 school districts. But working with a district the size of the Cleveland public school system — 78,000 students — was a new experience for Pentastation.

A training program had to be developed and implemented when Settles was hired in May. "To train Cleveland school personnel, we

brought our people to Cleveland and held training sessions in each school," Knerr said. "We limited the training sessions to small groups. There were a few problems, but training was completed during the summer."

The tight deadlines were blamed for problems with the system when school opened last fall. Administrators complained about a lack of training and support.

"The people who did not use a computer before followed instructions more closely than those who were familiar with computers," Knerr said. "We sent one employee to Cleveland to answer any questions or

problems an administrator had with the system."

Questions were raised about the vendor selection process. In April, the school board voted by a 6-3 margin to use the Pentastation system in its 42 junior high schools and high schools. Since Superintendent Frederick D. Holliday had used the system in two other school systems, Pentastation was awarded the contract without competitive bidding.

Today, with the Personal Computers in place, each school can produce its own reports. Reports for the entire school system require that each school transmit its data to the city's 3035. The city's mainframe then

sends the data to Pentastation's host system, which consists of an IBM 4341 and two Magnuson Computer Systems, Inc. M80 computers. Data is sent back to the Cleveland school system.

Pentastation is in the process of enhancing the system. "We have a new release that some of the districts are using," Knerr said. "It has enhancements to the grade reporting and daily attendance software."

"Some administrators have asked that we add word processing and other personal computer capabilities. These enhancements will be available in the future," according to Knerr.

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### DASD from page 49

and it is very simple to tell DMS/OS what you want to do, which you can simulate or go in live mode. It gives you that option; otherwise, you have to bring up the Job Control Language and build your control cards. Instead, DMS/OS asks you what you want to do. You can forget about that type of function because you have it on the screen."

### Need for 'stand-alone restore'

Sterling Software Marketing addressed initial shortcomings through enhanced releases, adding multivolume Volumes with the latest version. Dwyer said. One remaining shortcoming, he said, is the need for "stand-alone restore so we don't have to maintain two sets" of backup.

Dwyer has an additional need — the support of multivolume sequential data — that probably won't be addressed, "probably rightly so," he said; the product will not restore to more than one device.

After attending a DMS/OS seminar, Dwyer discussed it during a field managers' meeting, which included managers from all of the Montgomery Ward data centers. He was assigned the task of benchmarking it here, and a copy was sent to the Chicago corporate site. As a result, Montgomery Ward purchased DMS/OS for three sites, with the justification it would eliminate the need for a 3086 R2 at each site.





## NEWS

# OA system helps city, police grapple with crime stats

WASHINGTON, D.C. — A limited office automation system is helping this city's Office of Criminal Justice Plans and Analysis quickly generate reports on crime, repeat offenders and police resources, among other topics.

The OA system also permits that office to produce in one day the city's annual report on efficiency and results, something that once took a full year's worth of effort, according to Robert Lester, the agency's assistant director.

Included in the system are a Sony Communications Products Co. BMC-70 microcomputer and Sanyo 56 word processor, a Sony daisywheel

printer and dot matrix printer and two Sony portable word processing units called Typewriters.

The system also includes a Hewlett-Packard Co. HP 7470A two-pen plotter and a Corvus Systems, Inc. Corvus GMB 64K-byte Winchester disk storage unit.

Statistics and other data from the city's criminal justice agencies are entered into the BMC-70, stored on 24-in. disks and retrieved using the latest version of Corvus Corp.'s Data Base Management System.

City agencies that provide data to the Office of Criminal Justice Plans and Analysis include the police department, corrections department,

parole board, prosecutor's office, courts and a service agency that reports on suspects' pretrial status.

That data becomes the basis for the office's reports, which research such questions as which parts of the city have the highest crime or what percentage of arrests have resulted in convictions.

The agency, a branch of the mayor's office, "was always able to do these studies, Lester reported, but had to spend much more time producing them when using the police department's mainframe computer. Now, he said, many more reports will be produced than before.

The microcomputer, he said, "en-

ables people to be aware of the month-to-month changes [in crime data] much more accurately."

Final drafts of reports are written on the office's Sanyo System 56 word processor, which converts data and tables from the BMC-70 over office phone lines.

The charts and graphs produced by the BMC-70, using Redding Group, Inc. Graf-Tek software, are reproduced by the HP plotter.

They mark the first time the office was able to use such graphic devices in its reports and, Lester said, "it can translate data into a bar [graph] or a pie [chart], you can understand it."

## Trust the name

Lester said the Sony-based system was chosen over that of several other vendors because "we were very impressed with their word processing, and we trust the Sony name."

He also said that the portable Typewriters, which use microcomputers to record both voice and text, made the package attractive because final drafts of reports could be written on the Typewriters and then loaded into the system 36 without the need for retyping.

His only regret, he noted, is that the system is not IBM-compatible, a drawback that prevents the agency from swapping databases with national associations using IBM data processing products that he has on 5-bit processor. The system and the city roughly \$18,000, \$9,000 for the word processing system alone, Lester said. The system came on-line six months ago.

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What about security and control? PC/204 provides individual management views of

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### CCA's Executive DBMS Executive Schedule

Atlanta, GA	Mar. 1	Tallahassee	Mar. 14	San Diego	Apr. 12
Boston	Mar. 12	Dayton	Mar. 15	St. Louis	Apr. 18
Chicago	Mar. 19	Denver	Mar. 18	Washington, D.C.	Apr. 25
Dallas	Mar. 26	Albuquerque	Apr. 12	Albany	May 2
Indianapolis	Mar. 23	San Francisco	Apr. 19	San Jose	May 9
Louisville	Mar. 30	Portland, OR	Apr. 26	Seattle	May 16
New York	Mar. 7	Los Angeles	Apr. 23	San Francisco	May 23
Phoenix	Mar. 14	New Orleans	Apr. 30	Chicago, IL	May 30
Portland, OR	Mar. 21	Portland, ME	Apr. 27	San Francisco	Jun 6
San Diego	Mar. 28	Portland, ME	Apr. 27	San Francisco	Jun 13
Seattle	Mar. 28	Portland, ME	Apr. 27	San Francisco	Jun 20
San Jose	Mar. 28	Portland, ME	Apr. 27	San Francisco	Jun 27
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San Jose	Mar. 28	Portland, ME	Apr. 27	San Francisco	Nov 9
San Jose	Mar. 28	Portland, ME	Apr. 27	San Francisco	Nov 16
San Jose	Mar. 28	Portland, ME	Apr. 27	San Francisco	Nov 23
San Jose	Mar. 28	Portland, ME	Apr. 27	San Francisco	Nov 30
San Jose	Mar. 28	Portland, ME	Apr. 27	San Francisco	Dec 7
San Jose	Mar. 28	Portland, ME	Apr. 27	San Francisco	Dec 14
San Jose	Mar. 28	Portland, ME	Apr. 27	San Francisco	Dec 21
San Jose	Mar. 28	Portland, ME	Apr. 27	San Francisco	Dec 28
San Jose	Mar. 28	Portland, ME	Apr. 27	San Francisco	Jan 4
San Jose	Mar. 28	Portland, ME	Apr. 27	San Francisco	Jan 11
San Jose	Mar. 28	Portland, ME	Apr. 27	San Francisco	Jan 18
San Jose	Mar. 28	Portland, ME	Apr. 27	San Francisco	Jan 25
San Jose	Mar. 28	Portland, ME	Apr. 27	San Francisco	Feb 1
San Jose	Mar. 28	Portland, ME	Apr. 27	San Francisco	Feb 8
San Jose	Mar. 28	Portland, ME	Apr. 27	San Francisco	Feb 15
San Jose	Mar. 28	Portland, ME	Apr. 27	San Francisco	Feb 22
San Jose	Mar. 28	Portland, ME	Apr. 27	San Francisco	Feb 29
San Jose	Mar. 28	Portland, ME	Apr. 27	San Francisco	Mar 6
San Jose	Mar. 28	Portland, ME	Apr. 27	San Francisco	Mar 13
San Jose	Mar. 28	Portland, ME	Apr. 27	San Francisco	Mar 20
San Jose	Mar. 28	Portland, ME	Apr. 27	San Francisco	Mar 27
San Jose	Mar. 28	Portland, ME	Apr. 27	San Francisco	Mar 30
San Jose	Mar. 28	Portland, ME	Apr. 27	San Francisco	Apr 3
San Jose	Mar. 28	Portland, ME	Apr. 27	San Francisco	Apr 10
San Jose	Mar. 28	Portland, ME	Apr. 27	San Francisco	Apr 17
San Jose	Mar. 28	Portland, ME	Apr. 27	San Francisco	Apr 24
San Jose	Mar. 28	Portland, ME	Apr. 27	San Francisco	Apr 30
San Jose	Mar. 28	Portland, ME	Apr. 27	San Francisco	May 7
San Jose	Mar. 28	Portland, ME	Apr. 27	San Francisco	May 14
San Jose	Mar. 28	Portland, ME	Apr. 27	San Francisco	May 21
San Jose	Mar. 28	Portland, ME	Apr. 27	San Francisco	May 28
San Jose	Mar. 28	Portland, ME	Apr. 27	San Francisco	Jun 4
San Jose	Mar. 28	Portland, ME	Apr. 27	San Francisco	Jun 1

## NEWS

## Data base listing out Visicalc, Easywriter aids offered

**DETROIT** — Gale Research Co. has announced the publication of its "On-Line Data Base Search Services Directory," which provides detailed descriptions of the on-line information retrieval services offered by public, academic and private information firms in the U.S. and Canada.

Entries in the directory furnish up to 17 points of information about each organization, including items such

as on-line systems available, subject areas, associated services, availability and charges.

Six indexes provide analyses of the information contained in the entries to assist users in locating the most appropriate search service for their needs, according to the vendor.

The directory is priced at \$75 from Gale Research, located at Book Tower, Detroit, Mich. 48226.

**NAPERVILLE, IL.** — Software that teaches microcomputer users to use Visicalc's Visicalc spreadsheet program and Information Unlimited Software, Inc.'s Easywriter II word processing software is available from Dattak, Inc.

"Managing Your Business with Visicalc or Visicalc Advanced Version Program" provides users with an understanding of return on equity, the use of return on

sales to manage operations and asset and financial structures management, according to a Dattak spokeswoman. The package runs on IBM Personal Computers with at least 64K bytes of memory and Apple Computer, Inc. Apple II or Apple IIe microcomputers with at least 48K bytes of memory.

"Training for the Easywriter II" provides instruction on how to create, change, store and print documents using the word processing program. It consists of four diskettes and a printed guide.

The Visicalc tutorial is priced at \$70 for the IBM version and \$40 for the Apple version. The Easywriter II tutorial is priced at \$70. Both are available through Dattak sales offices.

Dattak is located at the East-West Technological Center, 1751 W. Dahl Road, Naperville, IL 60566.

## Multimedia courses unveiled on management, DP, personal skills

**ARLINGTON HEIGHTS, Ill.** — Advanced Systems, Inc. (ASI) has announced

multimedia courses on management, data processing and personal skills courses.

The courses include "Information Systems Project Management: Life Cycle Management"; "Information Systems Project Management: Project Control and Monitoring"; "Technology Perspective: Features and Differences of DOS/VS Release 1.5"; "MVS/SP: Sort/Merge Program"; "The Making of a Salesman"; "Dynamics of Sales Management"; "Supervisory Safety Series"; and "TYMEX 2800 Concepts and Facilities."

The course times range from 14 to 32 hours. Prices range from \$1,800 to \$12,600 per course.

Course tapes are also

available on a rental basis. ASI, 2340 E. Arlington

Road, Arlington Heights, Ill. 60005.

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## Book details Northeast DP job sites

**SCITUATE, Mass.** — The Bradford Co. has published a directory containing 600 listings of New England companies that use computers or employ computer professionals.

The 1984 New England Directory for Computer Professionals includes information such as the company's major business, latest fiscal year sales, sales growth rate and locations. The listings also include the names of company officers, department managers and size of work force.

Information about the company's data processing department includes the type of hardware, software, computer languages, data bases and major applications that are used. The directory contains appendices about employee benefits and user hardware.

The directory costs \$28.50 and is available from The Bradford Co. through P.O. Box 256, Scituate, Mass. 02066.



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## NEWS

## CALENDAR

## WEEK OF APRIL 2

## APRIL 9-13, SAN FRANCISCO —

The New DP Revolution. Contact: Technology Transfer Institute, 741 10th St., Santa Monica, Calif. 90402. Also being held April 23-27 Chicago and April 30-May 4 in Boston.

APRIL 10-11, WASHINGTON, D.C. — Personal Computers: A Hands-On Experience. Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

APRIL 10-13, WASHINGTON, D.C. — CISC/VLSI Application Design. Contact: Applied Technology Associates, Inc., Suite 300, 151 Park St. N.E., Vienna, Va. 22180.

APRIL 11-13, WASHINGTON, D.C. — How to Build and Use a Data and Information Resource Directory. Contact: Barnett Data Systems, 19 Orchard Way N., Rockville, Md. 20854.

APRIL 12-13, NEW YORK — The IBM Personal Computer: Making It Work in the IBM Mainframe Environment. Contact: Art Solomon, Technira, P.O. Box 10213, 72 Cummings Point Road, Stamford, Conn. 06904.

APRIL 12-13, NEW YORK — Micro/Personal Computer Operating Systems. Contact: Digital Consulting Associates, 890 Salem St., Wakefield, Mass. 01880.

APRIL 12-14, CHARLOTTE, N.C. — Carolina Computer Show. Contact: L & J Associates, Inc., Suite 102, 115 Broadfoot Ave., P.O. Box 53729, Fayetteville, N.C. 28306.

APRIL 13-15, ALBUQUERQUE, N.M. — International Personal Robotics Conference (IPRC). Contact: IPRC, 1647 S. Owens St. 46, Lakewood, Colo. 80226.

## WEEK OF APRIL 15

APRIL 16, NEW YORK — Introduction to the IBM Personal Computer. Contact: Center for Advanced Data Processing, Inc., Suite 402, 450 Seventh Ave., New York, N.Y. 10123.

APRIL 16, NEW YORK — Word Processing with Multimate. Contact: Center for Advanced Data Processing, Inc., Suite 402, 450 Seventh Ave., New York, N.Y. 10123.

APRIL 16-18, CHICAGO — Introduction to Data Communications. Contact: Systems Technology Forum, 9000 Fern Park Drive, Suite, Va. 22015.

APRIL 16-18, DENVER — Data Communications: An Introduction to Concepts and Systems. Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

APRIL 16-18, BOSTON — Data Communications: Effective Network Design. Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

APRIL 16-18, ROCHESTER, N.Y. — Data Communications Systems. Contact: Center for Advanced Professional Education, Suite 110, 1820 E. Gerry St., Santa Ana, Calif. 92706.

APRIL 16-18, WAKEFIELD, MASS. — Data Base Management. Contact: Center for Advanced Professional Education, Suite 110, 1820 E. Gerry St., Santa Ana, Calif. 92706.

APRIL 16-18, NEW YORK — Ad-

vanced C Language Programming Workshop. Contact: Structured Methods, Inc., 7 W. 18th St., New York, N.Y. 10011.

APRIL 16-18, ATLANTA — VM/SP Structure, Flow and Tuning. Contact: Goal Systems International, Inc., 5466 N. High St., Columbus, Ohio 43214.

APRIL 16-18, LOS ANGELES — DP Disaster Recovery Seminar. Contact: EDP Security, Inc., 181 West St., Waltham, Mass. 02154.

APRIL 16-18, LOS ANGELES — Managing Application Software Support. Contact: Infocel, Inc., Box 7117, Menlo Park, Calif. 94026.

APRIL 16-18, WASHINGTON, D.C. — Personal Computers: Strategies for Managing. Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

APRIL 16-18, CHICAGO — Videotext '84. Contact: Sally Summers, London Online, Inc., Suite 1180, 2 Penn Plaza, New York, N.Y. 10119.

APRIL 16-18, SOUTHFIELd, MICH. — Local-Area Networks. Contact: Center for Advanced Professional Education, Suite 110, 1820 E. Gerry St., Santa Ana, Calif. 92706.

APRIL 16-18, DENVER — Data Communications for Microcomputers: Acquisition, Application and Implementation. Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

APRIL 16-18, SAN JOSE, CALIF. — Network Communications Protocols. Contact: Center for Advanced Professional Education, Suite 110, 1820 E. Gerry St., Santa Ana, Calif. 92706.

APRIL 16-18, SAN FRANCISCO

— Office Automation Strategic Planning, Design and Implementation. Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

APRIL 16-18, SALT LAKE CITY — Personal Computers and Networking. Contact: Center for Advanced Professional Education, Suite 110, 1820 E. Gerry St., Santa Ana, Calif. 92706.

APRIL 16-18, ATLANTA — Technical Association of the Pulp and Paper Industry (Tappi) Computer-Aided Design Seminar. Contact: Tappi, P.O. Box 106113, Technology Park/Atlanta, Atlanta, Ga. 30348.

APRIL 16-18, SADDLEBROOK, N.J. — Structured Requirements Definition. Contact: Geopanna Carson, Ken Orr and Associates, Inc.,



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## NEWS

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**APRIL 16-19, NEW YORK** — CDS Delighting. Contact: Synd, One Park Ave., New York, N.Y. 10016.

**APRIL 16-20, DENVER** — Structured Design for Real-Time Systems. Contact: Youdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

**APRIL 16-20, ORLANDO, FLA.** — EDMS-DB Programming. Contact: Harris Education Center, 6230 S. Orange Blossom Trail, Orlando, Fla. 32808.

**APRIL 16-20, CHICAGO** — Information Modeling Workshop. Contact: Youdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

**APRIL 16-20, WASHINGTON, D.C.** — Network Performance Man-

agement. Contact: Institute for Software Engineering, 510 Oakmead Pkwy., Sunnyvale, Calif. 94096.

**APRIL 16-20, WASHINGTON, D.C.** — Data for Users. Contact: Webco Industries, Inc., P.O. Box 15006, 8613 Washington Ave., Alexandria, Va. 22306.

**APRIL 16-20, SAN FRANCISCO** — Project Planning and Control Workshop. Contact: Youdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

**APRIL 16-20, ATLANTA** — Structured Design Workshop. Contact: Youdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036. Also being held April 16-20 in Seattle.

**APRIL 17, NEW YORK** — Spreadsheet Using Lotus 1-2-3. Contact: Center for Advanced Data

Processing, Inc., Suite 402, 450 Seventh Ave., New York, N.Y. 10123.

**APRIL 17, NEW YORK** — Introduction to Ethos II. Contact: Center for Advanced Data Processing, Inc., Suite 402, 450 Seventh Ave., New York, N.Y. 10123.

**APRIL 17-18, WASHINGTON, D.C.** — The Second Annual Broadband Local Networks Forum. Contact: Architecture Technology Corp., P.O. Box 24344, Minneapolis, Minn. 55424.

**APRIL 17-19, ATLANTA** — Understanding Modern PMS Systems. Contact: Business Communications Review, 660 York Road, Hinsdale, Ill. 60521.

**APRIL 17-19, WASHINGTON, D.C.** — The 16th Annual Federal DP Expo and Conference. Contact: The Interface Group, Inc., 300 First Ave.,

Needham, Mass. 02194.

**APRIL 17-19, TOULOUSE, FRANCE** — The Sixth International Symposium on Programming. Contact: Professor B. Robinet, Université Pierre et Marie Curie, Alpha-66, 4 Place Jussieu, 75230 Paris Cedex 05, France.

**APRIL 17-20, BOSTON** — Structured Programming for Professionals. Contact: QED Information Sciences, Inc., QED Plant, P.O. Box 181, Woburn, Mass. 02181.

**APRIL 18, NEW YORK** — Ethos II for Applications Development. Contact: Center for Advanced Data Processing, Inc., Suite 402, 450 Seventh Ave., New York, N.Y. 10123.

**APRIL 18-19, ANAHEIM, CALIF.** — Higher Level Protocols for Data Communications Networks. Contact: The American Institute for Professional Education, Carnegie Building, 100 Kings Road, Madison, N.J. 07940. Also being held April 23-24 in Denver, Mass.

**APRIL 18-20, DENVER** — The Seventh Annual Rocky Mountain Data Processing Expo and Conference. Contact: Industrial Promotions West, Inc., 5090 S. Jamaica Center 204, Aurora, Colo. 80014.

**APRIL 19, PALO ALTO, CALIF.** — California Computer Show. Contact: Norm De Nardi Enterprises, 389 S. San Antonio Road 204, Los Altos, Calif. 94022.

**APRIL 19-20, LOS ANGELES** — Building Software Community. Contact: Infocad, Inc., Box 7117, Menlo Park, Calif. 94025.

**APRIL 19-20, ORLANDO, FLA.** — EDMS-DB Transaction Design. Contact: Harris Education Center, 6230 S. Orange Blossom Trail, Orlando, Fla. 32808.

**APRIL 20, NEW YORK** — Advanced PC-DBS & Contact: Center

## Afips OAC '85 to take place in Atlanta

ATLANTA — "Today's Partnership: People & Technology" will be the theme for the 1985 Office Automation Conference (OAC '85), which will be held next Feb. 4-6 at the Georgia World Congress Center here.

The focus of the conference, sponsored by the American Federation of Information Processing Societies, Inc. (Afips), will be on the business value that can be achieved through the use of office automation technology. It will examine office solutions that can improve individual and organizational performance.

Emphasis will be placed on successful approaches for achieving integration and compatibility between systems, user needs and business strategies, Afips adds.

The conference program will offer over 45 sessions in six tracks, including organizational impacts, "Office Workstations," "Ergonomics of the Work Place," "Communications Technologies & Issues," "Productivity & Requirements Evaluation" and "Networking Applications."

The registration fee for the full conference is \$150 in advance. Further information is available from OAC '85, Afips, 1800 Preston White Drive, Boston, Va. 22081.

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# VIEWPOINT

## Distributing centralized data entry function



THE DATA  
COURTESY  
JOHN P. Murray

If you are a data center manager that is still operating a centralized data entry function, there is a very effective method you should consider to reduce your data center operational costs, while at the same time improving the level of satisfaction of your data center clients. The method is to install software that will allow you to distribute the centralized data entry function. In addition to the acquisition of appropriate software, the process is to develop a plan that will secure the success of the venture and then to act on that plan.

The first step is the selection of a software package that will allow data center clients to enter their own data. The criteria for such a package are rather simple. It must be easily installed and maintained, the input screens should be easy to build and to change, and the vendor should have a proven record of a continuing high level of support to those who purchase the software.

Price has not been listed as an item of importance. The reason is that, at least in my experience, not only is the expense associated with the purchase of such software reasonable, but the potential pay back, even in a small data entry section, is so good that the purchase price of the package should not be a serious factor. In the situation with which I am familiar, a 10-member data entry section was distributed for a net annual savings (hardware and personnel) of \$180,000. The software investment was a one-time investment of \$18,000.

### Reliable products can be found

It is increasingly becoming the case with much of what we do in MIS that the issues involved in the distribution of the centralized data entry function center more on the political, emotional and the managerial than on the technical. The reason for this is that the technology in most areas has evolved to the point at which, if care is exercised, very good, very reliable products in all areas of the technology can be found, and they are getting better all the time.

Given that circumstance, consideration of the process used to move the data entry function in a successful fashion from the data center to the cli-

ent areas may prove helpful to data center managers who would like to carry out such an effort in their organizations.

A little background first. When we began to disassemble our data entry section, all client areas had CRTs, and the clients were comfortable with operating the units. We also had a standard, rigidly enforced data entry schedule for the buying forms to be submitted to the data entry section. If the input did not arrive on schedule, it would not be processed for the next cycle. From the MIS point of view, this was a necessary constraint; from the point of view of the clients, it was not always beneficial.

We began our project to disperse the centralized data entry function in the way we have found to be effective in many of our efforts to change and enhance our MIS environment. The first step, after we had obtained permission from senior management to move ahead, was to install and test the software thoroughly. The software was tested on a 90-day basis in order to assure its quality prior to purchase. Once the software was tested, we selected a client who had an interest in the process and began by moving several of his smaller jobs under the new system.

We used a sales/marketing approach in that we started small, worked very carefully and made certain we were successful in order to build credibility. The idea here was to build our case through the development of a successful track record. A requirement was to be able to demonstrate the productivity of that which we were proposing.

### Not met with unanimous joy

The announcement of the proposal to distribute the data entry function and responsibility to the client areas was not met with unanimous joy. There was understandable concern on the part of the clients who had the largest volume of data entry work that they would not be able to handle what they viewed as an increased work load. However, an examination of the function, which had been built by the data entry section prior to the announcement of the project, showed that the result of the change would not mean any increased work, only a change in function.

The crux of the argument was that, because the clients had been entering all information onto forms that then had to be delivered to the data center for keying, the direct entry of the input via the clients' currently installed CRTs would not take

any longer and in many instances would be faster.

Another positive aspect of this change was that clients would gain an additional three or more hours of time every day for entry of their data. This was because the keying, which would be done in the client areas, would continue almost to the time of the processing of the various batch jobs that required that input. Under the centralized function, time had to be provided each day to receive the input forms from the client areas and then key and verify the input data.

The project, which required eight months of time, was completed on schedule. A plan was developed to move the project ahead on a phased basis. The process was to identify a particular department, convert all the work in that department and provide the required training for the client department personnel before moving to the next area. The department with the largest volume of data was the last one to be converted. The plan was to begin with the small departments, not only to make more rapid apparent progress, but also to be able to identify areas of concern on a small scale and to learn as we went along. We viewed this as an appropriate way to minimize risk. The data entry section assumed responsibility for the project.

The plan to disperse the data entry section was announced to the data entry personnel well in advance of its implementation. It was made clear that the process would be carried out on a phased basis and that as the work level in the data entry section was reduced, we would work with the organization's Employee Relations Department to find those who were interested in jobs within other sections of the organization. Through careful planning, all but one of the data entry employees were offered (and accepted) jobs in other departments of the company.

Aside from the negative aspects of the reduction of the data center work load and expense and the improvement of scheduling considerations for the clients, one more unexpected, yet pleasant, benefit came about for the data center as a result of the success of the project: Computers almost at all aspects of the data entry work have disappeared. In all respects, the project has been a success. I certainly recommend it to anyone who still has a centralized data entry function in operation.

Murray is director of management information services for Regener Corp., Madison, Wis., and author of *Management Information Systems as a Corporate Resource*, published by Dow Jones-Irwin.

## LETTERS

### Look around at changing world instead of accepting compromises

Congratulations to Nissan Motor Manufacturing Corp., U.S.A., and congratulations to *Computerworld* for its editorial "Logic resting in the illogic" [CW, Feb. 20] on Nissan's bold decision to combine its information systems operation with its purchasing department.

Imagine! Information systems no longer reporting to or being "buried" in the finance or production departments. Instead, it reports to a function whose sole qualification apparently is that it is unbiased and "will not mold things to favor the parent department." Logical? Progressive? I think not. In fact, it sounds like a selection between the lesser of two evils.

Why not try a really radical approach: a function that operates as a full partner in the corporate plan and is recognized as the key strategic resource that it is quickly becoming. To do otherwise is to perpetuate an organizational convenience that has itself been a prime contributor to the information management problems that corporations like Nissan are trying to escape.

And while we're at it, why not select an information management *cum* business professional as

the department director.

What? You say that data processing people capable of managing a business function don't exist? Look again. Leading corporations that have come to recognize the importance that information systems have on their future are making these decisions every day.

I suggest that Nissan and *Computerworld* take another look at the rapidly changing world around them and stop being so content with compromises.

F. Richard Lennan

Vice-President, Administration  
United Technologies Shrock Alcorn  
Seattle, Conn.

### Info function: little new in concept of Nissan's "two-in-one" department

In the article "He heads 'two-in-one' department" [CW, Feb. 13], Robert A. Primar, vice-president of purchasing and information systems since Jan. 1, describes Nissan Motor Manufacturing Corp. U.S.A.'s "two-in-one" department as a "concept [that] might knock the computer industry on its ear."

I find little new in the concept. For years, orga-

nizations have been trying to control the information function through either divisions headed by non-IT vice-presidents. Only the naturally managed corporations recognize the need to place the responsibility of information systems under an unbiased vice-president who is recognized as a professional information systems person.

Patricia A. Shelby  
Lucy, Wash.

### Overlooking the obvious: Info systems, services tie together other departments

It is interesting to note that both Nissan Motor Manufacturing Corp. U.S.A. in the article "He heads 'two-in-one' department" [CW, Feb. 13] and *Computerworld's* editorial "Logic resting in the illogic" [CW, Feb. 20] have overlooked the obvious. Well-designed and functioning information systems and services tie together all the other production and supporting departments within, as well as the customer and vendor interfaces in an organization.

An integrated information systems and services department is most effective when headed by a

2nd LETTERS page 68

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## VIEWPOINT

### LETTERS from page 57

executive-level vice-president reporting directly to the president.

However, with today's inexpensive hardware, a case can be made for the following distributed information systems and services organizational structure:

■ The development of new subsystems resides in the engineering department using its own developmental computer.

■ The operation of the existing production system resides in the production (manufacturing) department using its own production computer.

■ Newly developed subsystems supposedly ready for production operation are first independently tested by the quality assurance department, using its own quality assurance computer, prior to turnover of the new subsystem to production status, by the training department on its own training computer, which is identically configured to the production computer; production personnel who ultimately must operate the new subsystem in the production environment; maintenance personnel who ultimately must maintain the new subsystem in the production environment; and user personnel who will use the new subsystem through terminals, phones and so on.

Each of these departments — engineering, production, quality assurance and training — having a portion of the information systems and services function as a subunit under it, reports to the president in the traditional organizational structure.

Which information systems and services structure, centralized or distributed, is most cost-effective depends on many factors. But either is inherently superior to the situation in which an entire information systems and services department is subordinate to one of the other organizational units.

A sound case cannot be made for each department independently developing and operating separate systems. Live business information needs to be constant in meaning and content at any given point in time throughout the organization. This cannot be effectively achieved without the use of an organizationwide data base, standards and data dictionary. Furthermore, such business information must be readily and simultaneously accessible by executive management and other departments in the organization.

Information standards and the data dictionary are maintained by the engineering department in the distributed structure or by the information systems and services department under the integrated structure.

All other things being equal, the integrated information systems and services structure provides the most efficient opportunity to undertake effective disaster recovery facilitation and data security measures. Information systems inherently ties together the entire organization. It doesn't make sense either to split it or subordinate it.

Paul F. Neuman  
Timonium, Md.

### Major reason for 'snake-oil' image of DP salesman: too much snake oil has been sold in form of computers

In response to Joseph P. Zammit's reader's-platform article "Are computer vendors getting a fair shake? How to avoid the 'snake-oil' salesman image" (CW, Feb. 13), the major reason for the "snake-oil" image of computer salesmen is simply that too much snake oil has been sold in the form of computers.

There are many small businesses around that have nonfictional horror stories to tell, and most of the businesses never used. No plaintiff's computer lawyer is going to succeed in telling a far-fetched computer fraud story to a judge or jury when Zammit or any other skilled attorney is representing the vendor.

It is quite common for a user to believe the salesman's claim, "This new model, the BDX, will meet all your computer needs." That salesman is usually billed as a "sales engineer" and is usually good at appearing to know what he is talking about. But too frequently, the salesman doesn't have the foggiest idea of that user's needs or the capabilities of the computer in question. Certainly, the user can be blamed for believing the salesman instead of clearly defining his needs and getting them written into the contract. One man has flourished for centuries because most people don't insist on everything written in blood.

I've always admired the lawyer who is able to win a case with a straight face, the following definition: "Your Honor, the plaintiff should not recover in this case if he was stupid enough to believe my client's sales talk."

It is interesting to note that some juries have rendered rather large verdicts in the past couple of years for users who have been victimized by fraud.

Because of those verdicts, some vendors have cleaned up their acts. One used to be proud of the general perception that it was the "bandaid" of the industry. Now it has matured and provides even some expert users with support.

Other vendors did not have much of an image problem to begin with, because they stood behind the products they sold, instead of hiding behind the small print in their standard form contracts. Tightening up their standard form contracts will help responsible vendors, but not the others.

Admittedly, the first-time computer user market is a difficult one for vendors. Those users are typically naive, unskilled and generally unwilling to appreciate the dedication of their own resources necessary to get a functioning computer system. Of course, the salesman is not going to make the sale if he emphasizes the difficulty of getting the BDX to work. But that doesn't mean that the salesman can prey on the user's naivete. It is at least deceptive, and probably fraudulent, to state that the BDX is the right computer if that's only a guess, even an educated one.

Vendors who encourage their salesman to have the attitude "Tell them anything in order to make a sale" are going to continue to have an image problem.

Edward G. Seifried  
Woburn, Mass.



## IN DEPTH

# A letter from users to vendors of application generators

By Glover T. Ferguson Jr.



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finish the job. This approach hurts both our development and our maintenance productivity in two ways.

First, our developers and maintainers must learn and retain their skills in multiple languages — they must know both the syntax of the generator and the syntax of the shop's traditional language. This requirement means a steeper learning curve for new personnel and generally higher level skills

for all personnel.

Second, the two-language approach creates confusion when testing or production problems arise. There is no single place to go to review the overall control flow of the application since the flow implied in the generator syntax may be contradicted or altered by the exit code.

#### Multiple debugging tools

Isolation of a problem in this environment may re-

quire multiple debugging tools — one for the generator syntax and one for the traditional code. The need for more tools increases the requisite troubleshooting skills of the programmer and reduces the test performance of the product.

An example of good continuity is Information Build-

**First, our developers and maintainers must learn and retain their skills in multiple languages — they must know both the syntax of the generator and the syntax of the shop's traditional language.**

era, Inc.'s Focus. This high-level information management system provides facilities for report preparation, data base management, interactive query and update. The following syntax example illustrates how the product provides essentially one syntax supporting a broad range of functions:

**SQL COMMAND AND COMPUTE NETWORK**  
**IF CLASS EQ 'A' THEN**  
**PRICE \* 1.10**  
**ELSE**  
**PRICE**  
**BY ITEM**

This statement will pass an inventory file and produce a report showing the total on-hand quantity of each item across all stocking locations. It will also compute and report a 10% price increase for all Class A items.

Passing a file, handling the break processing and summarization are large, high-level functions. Yet in the same statement and with the same style of syntax, we have an IF-test on a single field of each record passed. It is this type of continuity that we desire.

**Extensibility.** Extensibility features of an application generator allow the developer to implement new syntax, which allows productivity improvements that are unique to a given shop.

We accept that the basic syntax provided by you cannot be customized to the needs of diverse industries such as banking, manufacturing and distribution or functional areas such as general ledger, order entry, material requirements planning and decision support. Certainly the product cannot consider the unique architecture and demands of each application or enterprise. Extensibility features allow industries, functional areas and enterprises to extend and broaden the power of

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# IN DEPTH/LETTER TO VENDORS

the generator. We desire more than a CALL, PERFORM or DO function as a means of extending products. Subroutines can provide common functions for our developers, but they do so at the expense of clarity. The usual interface to subroutines involves defining and formatting data areas that provide communication between the main routine and the subroutine. When maintaining or debugging the code, we must often trace back through the program to determine the exact contents at the time of the error.

Furthermore, it is often more work to invoke the subroutine than to recode the function in-line. This means the common function must be fairly large before it is economical to provide it to developers.

We would, therefore, prefer to extend the functions of our development environment by defining new syntax. New syntax can document the function being performed more clearly than subroutine call interfaces that have to be examined closely to reveal the same information. For example:

```

CONVERT DATE FROM JULIAN (WS-JULIAN)
TO CALENDAR (WS-CALENDAR).
is far more descriptive than
CALL "DATECONV" USING
WS-DMO
WS-FROM
WS-TO.
    
```

Another advantage that syntax has over subroutines is that it can be partially validated at the time it is entered or prepared for execution. A call interface can only be checked by

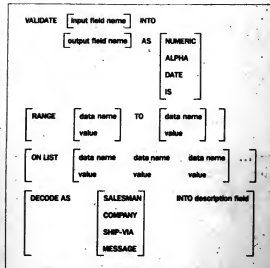


Figure 1

the subroutine during the execution of a test.

Finally, syntax extensions support our first requirement of continuity. Training programs for developers should include both the basic and extended syntax as opposed to basic syntax and a potentially di-

verse set of subroutine interfaces.

Panaphic Systems, Inc.'s Gener/ol is one product that provides extensibility features by allowing developers to augment the existing syntax. Gener/ol is an interactive on-line program development system that allows developers to add commands to

its vocabulary, specify syntax rules for the new commands and pass data through the syntax to a user-written command processor. A potential use of this feature is to provide access to data base management systems other than those already supported by the vendor of the product.

A second example of an extensible product is Applied Data Research, Inc.'s Meta-Cobol. Meta-Cobol provides, among other things, a macro preprocessor for the Cobol language. This preprocessor allows a development group to extend the Cobol language with powerful statements that still maintain the style and data definitions of the original syntax. Figure 1 is an example of the use of this product.

This example shows two types of Cobol language extension. First, there is an application-independent function — validating the format of input fields and editing the data into a known, fixed format. Second, the implementation of the DECODE syntax references tables that are specific to a given shop such as the SALES- MAN and COMPANY tables. This same syntax has been used to generate Cobol validation code for batch programs and for on-line programs that interface with IBM's CICS/VS.

Performance. The performance of the application generators should be sufficient to allow implementation of all but a few of the application functions. Remember the 1977 Kendall Report?

Figure 2 implies that even an inefficient generator can be used to generate 50% of our programs since they

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## IN DEPTH/LETTER TO VENDORS

only consume 2% of the CPU. The diagram also suggests that we take great care with the 2% of the programs that consume 50% of the CPU, since relatively minor inefficiencies in implementation could dramatically increase the cost of running these applications.

The key to productivity is the remaining 48% of the programs that consume 48% of the CPU. If the generator can support these programs with adequate performance, then application generation can be the development approach used for at least 98% of the shop's applications. We can concentrate developer training on the proper use of the generator and retain a few people familiar with traditional languages to support the last 2% of the shop's jobs.

If the generator devours too many hardware resources to be considered for the middle 48% of our programs, then we must either support a split staff and two training curricula, or we must make everyone competent in both traditional and generator-based development techniques. The former approach is expensive and limits the flexibility with which we can assign people to projects. The latter approach tends to provide personnel who are adequate, but not expert, in both approaches.

**Responsiveness.** A responsive product allows the developer to define processing requirements interactively and then begin testing without a significant delay or disruption in the work flow.

Some generators require a lengthy preparation time after logic entry



Figure 2

and to transcribe, compile and link the logic into executable code. Under these conditions, developers usually fill their time by working on several programs concurrently. However,

when moving back and forth from one program to another, the developer's concentration is broken. The time and effort spent in regaining focus on a particular set of logic and

test conditions lowers productivity and may lessen the quality of the final product.

We never have found substantial morale differences between developers working in environments that provide immediate reinforcement and those that do not. This points to a more subtle way in which delays can hurt productivity. Behavioral psychologists say we learn most quickly when we receive immediate positive reinforcement for correct behavior and immediate negative reinforcement for incorrect behavior. A delay between coding and testing robs us of the immediacy and satisfaction of the reinforcement that testing should provide.

A number of application generator products are very interactive and do not require an off-line preparation procedure. Oxford Software Corp.'s UFO briefly prepares code for immediate execution without having to submit the code to another environment for preprocessing. IBM's Query System Product/Application Development allows interpretative execution of application logic during testing. The interactive nature of these products has enabled us to make significant strides toward meeting our goal of responsiveness.

**Power.** A powerful application generator will allow us to manipulate large sets of data instead of individual elements or aggregates. Also, it will allow us to perform many or complex operations with a few simple commands.

Power allows our design, coding and testing efforts to rise above the

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8	WOLFE	MSL 80/85	50	18	WOLFE	Systems Programmer	50
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## IN DEPTH/LETTER TO VENDORS



Figure 3

level of detail required in traditional approaches. In some cases, power has actually decreased when we moved from our traditional languages to the application generator. For instance, some generators have particularly weak table and array handling, a feature we take for granted with traditional languages such as Cobol or Fortran.

Another common weakness is the

failure to provide field edit and re-formatting facilities that will automatically perform validation and data reformatting functions when entered by the end user from a terminal.

An example from Focus emphasizes power:

**NUM QUANTITY AND ROW-TOTAL AND COLUMN-TOTAL**

**BY PRODUCT ACROSS LOCATION**

This statement might produce a report that looks like Figure 3.

This statement navigates the data base looking for all inventory segments and then totals the QUANTITY amount across all stocking locations and reports the totals by product and by location with both columnar and row totals. This is all performed without our having to code loops, low-level data base navigational commands, control break or page break logic. Hence, the importance of power in an application generator becomes quite apparent.

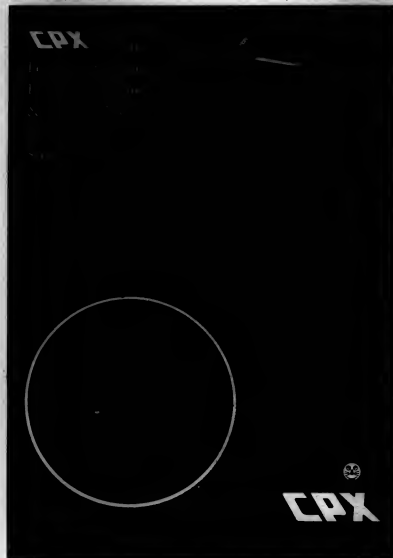
Compatibility. Compatibility features allow applications created by the generator and applications created by traditional approaches to present a single system image to the terminal user. Without this feature, the users of our systems may have to follow a procedure such as the one shown below:

- Sign on to the execution component of the application generator.
- Request the desired function.
- Sign off the execution component of the application generator.
- Request a traditional application function.
- Sign back on to the application generator.

In many instances, vendors have designed a separate environment within the on-line monitor. Within this sheltered world, application generator functions are implemented. What has been neglected is a programmatic means of entering and exiting this environment in order to execute functions that reside in traditional applications.

Some of us have not been too affected by this problem. Either our users have had work assignments that did not encompass both traditional and generated applications or we have based our entire application inventory on the generator. Most of us, however, must continue to live with both old and new applications until the older ones can be retired through attrition.

To date, the best examples of compatibility have been found in approaches that create or assist in the creation of traditional language programs. IBM's Elia provides Cobol or PL/I shell programs into which "bricks" of code are placed as the developer specifies the processing needed. Application or shop-specific logic is then added to the shell to complete the program. Since the resulting program is in the traditional language, it can provide a programmatic interface with existing applications.



## IBM'S LETTER TO VENDORS

Testing support. Interactive debugging facilities should be integrated with the development and execution components of the application generator. These facilities should include the following features:

- The ability to place breakpoints at any statement.
- The ability for breakpoints to be conditional on data values.
- Symbolic display of records and working areas from any breakpoint.
- The ability to correct syntax logic at any breakpoint and to continue processing.
- The ability to trace the application logic flow interactively.
- If the execution components or user extensions to these components are written in the language of the generator itself, the debugging facility should not load the developer into this code. The developer should need to debug only the logic that he has coded.

**Maintainability.** The structure of the generator syntax should encourage the creation of maintainable code.

Good structure can be encouraged by prompting the developer to specify his logic in levels of progressively more detailed program definition oriented to the inputs and outputs of the major data structures.

Separation of control logic from processing logic can be encouraged by controlling the use of statements that effect major changes in the flow of logic. These statements should be confined to specific areas of the program that reside at a high level in the logic hierarchy.

At each level the developer can be prompted for a description of the major business functions being performed at that level. The syntax should be self-documenting as to how the function is implemented; the comments are required to describe what the business problem is.

An example of a highly structured generation dialogue is found in IBM's Cross System Product/Application Generation. This product guides the developer through definition of the processing logic in a top-down, step-by-step fashion. A developer using this product is prompted to describe an application in terms of a group of processes.

**By forbidding the developer to jump from process to process in code other than the flow section, a discipline is imposed on the resulting program that tends to enhance the system's reliability. It cannot thwart a pathological programmer, but it can at least encourage sound programming practices.**

Processes consist of statements and statement groups supporting input or output of data from a file or terminal. Each process has three separate sets of statements associated with it.

First, the Before statements prepare for the I/O by formatting the data to be displayed or the key of the record to be read. Second, the After statements manipulate the data in-

put or examine the return code of the I/O function. Third, the Flow statements alter the default flow of one process to another based on function keys, entered data or other conditions.

By forbidding the developer to jump from process to process in code other than the flow section, a discipline is imposed on the resulting program that tends to enhance the reliability and reliability of the

system. It cannot thwart a pathological programmer, but it can at least encourage sound programming practices.

**Postscript to developers**

We have cited a number of areas where you could improve your products to deliver more productivity benefits to us. But what do we do while we wait for the requested changes?

There are a number of strategies that offer an interim solution and, although the choice of strategy depends on the needs of each specific shop, some general recommendations can be offered:

1. Decide whether or not to use a generator for a particular application during the technical design of

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## IN DEPTH/LETTER TO VENDORS

the system rather than when you begin to implement. This will allow the designers to weigh the continuity characteristics of the tool, its performance, its power and its compatibility with existing systems against the complexity of the application and the needs of the users.

For instance, some tools can perform simple tasks very easily, particularly if the designer uses the strengths of the product in-

stead of battling its weaknesses. Also, many applications may have a relatively short expected life span and, therefore, are insensitive to the fine points of maintainability.

2. Provide proper training in the use of the application generator for both the programmer and the designer. If the designers are to evaluate correctly the product for use in a specific application, they must under-

stand its strengths and weaknesses. If programmers are to attain the advertised benefits, they must understand how to use properly the tool. The generator should be treated with the same respect as we have given traditional languages in terms of training and technical support.

3. Analyze where the time is really being spent in your shop. Perhaps you concentrate on maintenance and

do very little development, or perhaps your systems strategy has emphasized the installation and tailoring of application packages over custom development. In these cases, an application generator can do little more than support the creation and maintenance of test data.

They may still provide significant value, but their requirements of the package are a bit different in this

environment than in the custom-development environment.

4. Get control over your traditional development process. Until the generators improve or unless they are suitable for your shop as they stand, important systems will continue to be built using traditional languages. However, there are many opportunities for productivity

*The generator should be treated with the same respect as we have given traditional languages in terms of training and technical support.*

improvement in these situations.

To seize these opportunities, you need:

- Management commitment to treat systems development as a normal business activity.
- An established methodology for systems development that can provide a framework within which productivity and quality can be managed.
- A well-defined technical architecture that will result in the use of a small set of well-tested techniques.
- A training program that teaches the prescribed set of design and implementation approaches.
- Software that insists or encourages that the standards and approaches, described in the technical architecture and which are explained in the training, are consistently applied to the development process.

#### About the author

Glover T. Ferguson Jr. is a manager in the Technical Services Organization within the Management Information Consulting Division of Arthur Andersen & Co., Chicago. He has worked in systems development for nine years and is manager of the CICS Futures Task Force within IBM's Ourside group.

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## IN DEPTH



## Up from disaster

By Eli Hiller

Late last year, a Philadelphia-area company entered the final stages of converting its data processing operation. The firm anticipated a Jan. 3, 1984 cutover date from its Honeywell, Inc. 2200 mainframe to an on-line Data General Corp. Eclipse MV/10000 supermini. Necessary system modifications, procedure writing, system training and data conversion were complete by the Dec. 29, 1983 year-end accounting cutoff.

Through its 10 subsidiaries and affiliates, the firm serves the insurance, health-care and leisure markets. In November 1983, the company spun off its data processing subsidiary through a public stock offering. The data processing subsidiary developed three industry application packages: subscription fulfillment, floor-covering industry software and an insurance package. The latter was being installed by the insurance subsidiary with a planned Jan. 3 cutover.

When the holiday weekend arrived, the only remaining task was to perform a data base load that required some 30 hours of computer time — 27 of which had been completed — and the operation was started the morning of Dec. 31, 1983.

At approximately 11 a.m. on New Year's Day, a fire started in the heater area of the two-story, 25,000-sq-ft

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***A \$25-million-a-year conglomerate with a substantial insurance business was three hours away from converting from a Honeywell 2200 to a Data General Eclipse MV/10000 system. Then, on New Year's morning 1984, fire wiped out corporate headquarters.***

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## IN DEPTH/UP FROM DISASTER

headquarters building. The building housed all of the various subsidiaries and affiliates and their records as well as several computer systems. The fire quickly spread and by 1 p.m. had gone to five alarms. When the fire was finally tapped out some 10 hours later, the building was a multimillion-dollar total loss. Both the Honeywell 2300 and the DG Eclipse suffered fire and water damage; they were completely unusable.

The co-located data processing subsidiary decided to move elsewhere, leaving the former parent company with an immediate need. Our consulting firm, which had been hired to assist in the conversion, had previously written several disaster plans. Unfortunately, disaster planning was not part of the data processing system conversion en-

***The fire quickly spread and by 1 p.m. had gone to five alarms. When the fire was finally tapped out some 10 hours later, the building was a multimillion-dollar total loss. Both the Honeywell 2300 and the DG Eclipse suffered fire and water damage; they were completely unusable.***

agement, even though the client was queried as to its preparedness in case of disaster. The client gave the usual assurances: There was an off-site tape storage system, a back-up insurance company microfiche system and accounting records kept in a fireproof safe on premises. For the most part, duplicate or backup accounting records were not main-

tained off-site.

Upon inspecting the scene on Sunday afternoon and speaking with the company's executives, who were all in a state of shock, it became apparent that not only was an instant disaster plan required, but it would be necessary to oversee the execution of the plan as it would be several days before the shock subsided.

There are many consultants who have developed disaster plans, but few, if any, who have managed the execution of such a plan.

Recovery of the data processing capability as well as the corporation in general is most difficult for single-site companies with under \$100 million in revenues. Larger companies weather disaster better through distributed processing: If one IBM 3081 goes down in a disaster, the company shifts the data processing load to another 3081 in the next city or state.

Two realizations were key in writing an instant plan on Sunday evening.

■ Two-thirds of all companies fail after a major disaster, according to insurance statistics.

■ The reliability and judgment of the generally capable executives of this company could not be completely trusted for several days because of the varying degrees of shock each continued to sustain.

The disaster plan, therefore, had to be simple as well as foolproof in restoring the company to a functioning condition within a very short period of time. The target date of Jan. 9, 1984 was selected as achievable given a Herculean effort and no mistakes in performing what had to be done.

The disaster plan developed had only six items, each of which was put under one of the executives as his only responsibility. Employees were assigned to each of the executives as work teams in executing that responsibility. The teams would be controlled and their progress monitored from a nearby hotel conference room. The company's executive vice-president and our consulting firm were put in charge of the conference room, which also served as the "command post."

In order to maintain open communications but control rumors and make vital information generally available, a daily meeting would be held to brief all of the executives on each team's progress. Additionally, problems encountered by a given team would be brought up for discussion and solution.

The disaster plan was as follows:

- Site security, salvage and record restoration.
- Public notification.
- Locating a new facility.
- Capital equipment acquisition for the new facility.
- Insurance negotiation.
- Processing restoration (manual and computer systems).

At 8 a.m., Jan. 9, the first executive meeting was held. The disaster plan was described to the company's executives, and each was assigned a responsibility.

#### Maintaining security

As there were some 10 subsidiaries and affiliates housed in the headquarters building, each wanted immediate access to its areas to salvage what it could. It was extremely difficult to explain to some of the middle-level managers who were trying to gain instant admission that what had not been burned had suffered extreme water damage, and they would have to wait until formalities were cleared. As a matter of fact, half of the building had collapsed and the other half was deemed unsafe.

After a major fire in Pennsylvania, the law provides that the state

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## IN DEPTH/UP FROM DISASTER

fire marshal must inspect the premises before salvage operations can commence.

Additionally, a release from the insurance company must also be acquired. This was finally accomplished by the morning of Jan. 4.

Fortunately, some of the company's accounting and payroll records were spared because of the fireproof safe; these records were taken to a large ballroom of a nearby motel for cleaning and sorting. All salvaged company records, regardless of subsidiary ownership, went through the same process in order to maintain control and knowledge of the salvage operation. All salvaged documents

*The disaster plan developed had only six items, each of which was put under one of the executives as his only responsibility. Employees were assigned to each of the executives as work teams in executing that responsibility.*

were copied and the originals destroyed as the fire odor had permeated the paper.

Documents that could not be copied were sent to a company in New Jersey that has a freeze-drying process to restore documents and remove the odor. The relocation of salvaged documents to a new facility would bring the undesirable odor into the new premises, and it would linger.

Surprisingly, the insurance company's microfiche was also salvaged, although it suffered smoke and water damage. Bell & Howell was notified, and two specialists from its Chicago-area headquarters arrived to instruct the salvage team employees how to treat the microfiche. That involved a rather labor-intensive ammonia process.

The team operated successfully and performed their assigned functions, including securing the old premises and salvaging a large number of documents from the disaster.

Most of the insurance files relating to ratings, agents and benefits were salvaged. About one-month's key entry could not be reconstructed.

#### Public notification

The company, which is a publicly held corporation, was required to notify the Securities and Exchange Commission, as well as the Insurance Department of Pennsylvania. During the course of the week, it also had to deal with insurance agents and policyholders, the press and the public at large.

Since a substantial portion of the company's vital documents had been salvaged, a news release was prepared that reflected the company's expectation to continue operations. Trading was suspended for one hour pending publication of the press release and resumed thereafter.

The Insurance Department of Pennsylvania visited the company's "command post" and discussed and analyzed the disaster plan. They were satisfied that the company could resume its insurance business given the proper execution of the disaster plan. The department then

offered its assistance, particularly in providing copies of older insurance forms and rate tables (generally required for duplicate policy issues). The forms were on file in Harrisburg, Pa., as required by the insurance department's regulations.

The Consumer Services Department of the insurance subsidiary was organized to deal with the agents, policyholders and public through telephone contact.

#### Locating a new facility

The chief executive officer of the company wished to relocate to the same general area. He also decided to rebuild at the same location of the destroyed headquarters. The ground and building were owned outright by the company, and the executive had to deal with a host of realtors each



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## IN DEPTH/UP FROM DISASTER

*The problem was further complicated as a result of the AT&T divestiture. Three pieces of the old Bell system had to be contacted for a permanent restoration: Bell Atlantic for local and intrastate Wats, AT&T Communications for interstate Wats and AT&T Information Systems for equipment.*

offering his available properties.

A short-term lease and a previously occupied office facility that would require minimal leasehold improvements was the most desirable course of action. Fortunately, they were found on Jan. 4.

The architectural plans were given to the coordinating team, and the facility was designed for the housing needs of all the subsidiaries

and affiliates that evening, using as much of the existing layout as possible.

A meeting with the architects took place on Thursday, and the lease was executed Thursday evening. Alteration work began Jan. 6.

From the outset it became apparent that in order to restore functionality by Jan. 9, four items of capital equipment would have to be in place by that date. These

items included a telephone system — private branch exchange (PBX) — office furniture, typewriters and copying equipment.

As part of its leisure group, the company owned a modest Bell Atlantic was contacted, and by the afternoon of Jan. 2, it had restored six of the 30 telephone lines the company had been using. The lines were hooked up to the motel, and the Consumer Services Department worked out of several motel rooms the entire week.

The process of reestablishing the entire telephone system was much more difficult. It was further complicated as a result of the AT&T divestiture, which became effective the first day of 1984.

#### Telephone troubles

Three pieces of the old Bell system had to be contacted for a permanent restoration: Bell Atlantic for local and intrastate Wats, AT&T Communications for interstate Wats and AT&T Information Systems for equipment. As of the first week of January, none of the three talked to each other except through a service-order paper process that none of the companies apparently understood.

For example, AT&T Communications had to issue a service order to Bell Atlantic to hook up the interstate Wats. That situation was alleviated by appealing to the old Ma Bell's common sense under an emergency condition, and slowly the lines were brought by Bell Atlantic to the new building's demarcation strip.

The slowness of the process was largely due to the company having 30 different listed and unlisted telephone numbers on two exchanges. With the exception of eight of the telephone numbers, (which no one could remember), none were in sequence as each subsidiary or affiliate had its own number.

Under divestiture, the responsibility of the Bell operating company ends when it literally brings the physical wire to a front door. It was decided that the company would take three proposals for internal equipment: the existing independent supplier (Ericsson), Bell/AT&T and Rolm Corp. The two independents both offered a temporary PBX that could be installed over the weekend of Jan. 7, including wiring the new facility.

#### Slow to respond

Bell Atlantic, strangely enough, proposed a Japanese-made PBX rather than a Dimension or Horizon system. The company encountered difficulties in attempting to contact AT&T Information Systems and

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## IN DEPTH/UP FROM DISASTER

find the organization responsible for Dimension or Horton equipment sales. Eventually, the appropriate organization was found, but the response did not seem to take into account the urgency of the situation.

The Rolm equipment was finally chosen and a temporary switch installed over the weekend of Jan. 7. The choice of Rolm and its Philadelphia-area distributor, FTC, was based upon the

systems capability in handling both voice and data as well as its ability to provide and install a temporary switch over the weekend.

The final issue of capital equipment selection needed for Jan. 8 functionality were typewriters and copiers. IBM Selectric IIIs and Xerox Corp. Marathon 70s were chosen based upon quality hardware, price and immediate delivery. Forty typewriters were shipped over the

weekend and arrived on Jan. 8. Xerox provided loaner copiers and the first Marathon was delivered Jan. 13. A decision was made to leave the issue of noncapital equipment and supplies up to the individual departments because the ordering and delivery process is a routine matter.

Another area of concern in a multimillion-dollar disaster is insurance company negotiation. Based upon the

experience of this disaster, the use of a public adjuster retained by the insured is generally worth the \$N fee. A public adjuster can achieve better settlements. His professional approach is superior to an inexperienced executive assigned to the task and helps eliminate the possibility of bias.

#### Processing restoration

Processing restoration was the most vital area of

concern for the insurance company, which must collect premiums and pay claims. Both tasks are feasible on a small basis for a short period of time, providing functionality has been achieved. There was little concern for the health-care and leisure operations of the company since both of those departments depended upon their own field facilities, which were not affected by the fire.

A team consisting of the underwriting manager and the claim manager of the insurance operation was assigned the task of developing a plan for manual processing. That plan was to be completed by Jan. 8 and reviewed by the executive committee.

However, it was also known that the off-site magnetic tapes and some of the salvaged tapes could be used to continue processing on a Honeywell 2300. A service bureau with a Honeywell 2300 about 100 miles away was found, and arrangements were made to use that facility. An agreement was formed to use the site until the DG equipment could be replaced and conversion restarted.

This choice eliminated the urgency of acquiring equipment overnight, including 30 terminals that could now be supported through the Rolm CIX without the need to wire the building for data. Also, recovering from the loss of the new procedure manuals, which were not salvaged, had to be considered in order to restart the conversion. The above plan, therefore, permitted an orderly conversion planning effort that could be undertaken during the rest of January to install the new system and have it operational by March 1.

This processing restoration approach covered all bases. There was little basic disruption, and the approach gave the insurance operation the ability to continue processing, including its unfinished year-end work. The only difference would be a delayed systems reference since listings would be provided, rather than a daily updated Honeywell file loaded onto the MY/10000 and accessed via a terminal. The plan also offered a carefully thought-out manual backup if the remote-site Honeywell 2300 became too burdensome.

Cutover is now planned for April 2.

#### About the author

BH Miller is a management consultant based in Cherry Hill, N.J. BH Miller and Co., Inc. specializes in contingency planning and business systems planning. Previously, Miller was a manager in Coopers & Lybrand's Management Consulting Services Department.



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## IN DEPTH

## Reusable code, reliable software



By F. Arnold Romberg  
and Alan B. Thomas

Expert systems using knowledge bases derived from a library of program specifications will be essential to fifth-generation software development. Intelligent management of reusable code will be one of the major benefits provided by these development tools.

Whenever a radical improvement is made in either hardware or software, a new generation is hailed. Progress through the fourth generation has been somewhat independent in hardware and software. Improvements in one area

*'We are concerned here with one way program verification and reusable code may be combined under the direction of an expert system to produce more reliable software in less time with fewer people. The necessary technology is in the development stage. . . . Fifth-generation hardware will support fifth-generation software development methodologies.'*

have stimulated and benefited from improvements in the other. However, looking back, we can see that the progression from one generation to the next in hardware was not essential for the radical improvements in software that justify the recognition of a new generation, and vice versa.

The frontiers in both hardware and software have now arrived at the transition between the fourth and fifth generations. It does seem to be a happy circumstance, since the next major advances in both hardware and software will be much more closely intertwined than any prior advances.

The Japanese have committed their computing industry to leapfrog into a position of worldwide leadership. Their efforts center on development of large and small inference engines. These processors reference large amounts of information stored in knowledge bases to identify probable additional facts and verify and modify these through dialogues with users to develop more information. Coupling an inference engine with a particular knowledge base yields an expert system. Such a system combines hardware and software to provide great help to a user by supporting him in the same way that a human expert would.

Effective use of inference engines requires development of hardware and software tools to make these powerful devices less complex and more rewarding. The fifth-generation knowledge manipulation machine will dramatically

## IN DEPTH/REUSABLE CODE

change the way software is developed.

We are concerned here with one way program verification and reusable code may be combined under the direction of an expert system to produce more reliable software in less time with fewer people. The necessary technology is in the development stage. The individual components are commercially available today. Fifth-generation hardware will support fifth-generation software development methodologies. Intelligently managed reusable code is one of the important elements of fifth-generation software development methodology.

## Development stage

The many problems with software development are well-known: It

***That the term "software engineering" has come into use is an indication of our hope that software development can move from being an artistic endeavor to being a process of pragmatic construction. "Information engineering" concerns the whole range of information handling activities.***

takes too long to develop an initial package; package reliability will be poor at first and will improve only with intensive code maintenance; errors are uncovered only by attempts to use the package, and some may persist well into its useful life; and the whole process costs too much. James Martin, in *Application Development Without Programmers*,

catalyzed these faults and identified a primary approach to solutions: Increase the use of high-level languages both by data processing professionals and by users. That the term "software engineering" has come into use is itself an indication of our hope that software development can move from being an artistic endeavor to being a process of prag-

matic construction.

The replacement of "software engineering" with "information engineering" suggests that this process is more and more one that must concern itself with the whole range of information handling activities. The process starts with determining the goal of the information processing to be done and involves analysis and design of all phases of information handling, not just construction of computer programs.

Computer systems producers, both analysts and programmers, are good targets for productivity improvement. In part, this situation is the result of labor economics: Relatively high salaries, resulting from great demand in a labor-intensive field, are a prime motivation for automation. In part, it is also a result of the increased opportunities for and willingness and ability of computer systems people to change jobs.

Turnover has made it imperative that means be found to enable the developer of a system less a part of and less essential to its continued successful use. Fifth-generation systems development technology must reduce the need for systems maintenance and for human expert knowledge when systems are extended, because the humans who have that knowledge are not staying with the systems they develop.

## Significance for fifth generation

Each passage from one software generation to the next has been marked by a significant advance in the ease of producing programs. The second generation was marked by the advent of assemblers to relieve the programmer of much of the work of determining machine memory addresses and operation codes. Third-generation languages required look over the task of selecting the machine instructions. New fourth-generation languages are letting the computer perform some of the decisions about how the processes should perform some of the tasks specified by the programmer.

Although these languages have been labeled "nonprocedural," it is more more accurate to call them "less procedural." The programmer is freed to concentrate on the aspects of the procedure that are of significance to the problem at hand, leaving the computer to take most of the responsibility for the aspects that are largely concerned with the details of the computer processing.

The term "fifth-generation software" has not yet been accorded a standard definition. However, it is generally used to refer to systems development approaches in which the man/machine interface is only at the specification level, while the organization of the specifications into the facts needed to create an information processing system is carried out by the software development system.

Both fourth- and fifth-generation software development methodologies emphasize the statement of application system requirements and logic in problem-oriented languages. Requirements stated in these terms may then be reviewed, tested for consistency and completeness and used to produce preliminary results for prototyping. They become the basis for generating system components such as programs and data structures.

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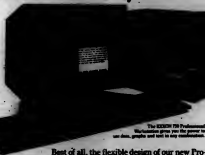
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## IN DEPTH/REUSABLE CODE

managed library of reusable code is essential to the effective use of these techniques.

#### What's the big deal?

Reusable code is an important approach to reducing the cost of software development while increasing the reliability of the finished product.

Everyone who has taken an introductory programming course in Basic knows about subroutines. Anyone who has written more than one program has reused sections of code. All who have worked alongside other programmers have reused other people's code. Whenever a program is bought, sold or copied, it is with the intention of reusing code. The other side of the coin is that probably the majority of all code is written to do

*Intensive use of a piece of code as soon as it is complete and while the development mechanism is still in place can lead quickly to a high level of reliability for the whole remaining life of the code. The prospect of using a piece of code in many contexts justifies the effort of more thorough testing.*

tasks that have already been programmed before, somewhere else, in some other environment, for some other purpose.

Major efforts have been put into making existing code available where needed, and many fortunes have been amassed doing so. However, the success of fifth-generation systems requires several order-of-

magnitude increases in the application of reusable code. The challenge is to surmount the technical and logistical obstacles to achieving these increases. When they are achieved, each of the problems with software productivity will be directly and significantly affected.

The development expense for a piece of reusable code may be spread

across many programs in which it is used. Alternatively, it may be regarded as practically free for all users after the first.

Shared use leads to faster discovery and removal of errors. Intensive use of a piece of code as soon as it is complete and while the development mechanism is still in place can lead quickly to a high level of reliability for the whole remaining life of the code. The prospect of using a piece of code in many contexts justifies the effort of more thorough testing. The use of a mature piece of code in a new application shortens the testing time for that application, too.

An important impact on code testing practice is that the expense of applying formal verification methodologies is more easily supported when the resulting code will be widely used.

Production of one piece of code to do the work that would otherwise require many coding efforts creates obvious savings of time and effort in specification, design, construction and testing. These savings are minimally offset by the need to meet the interface requirements of a large set of environments in which the code will be used. The net effect is substantially reduced development time and cost. The savings are compounded as the resources freed are applied to additional development.

A subroutine library is the most common form of reusable code. Management of a subroutine library involves determining support responsibility, documentation standards and maintenance cycles. Talented programmers may submit routines for a companywide subroutine library. Decisions about the acceptability of such routines are difficult because of a lack of control over these concerns.

Another problem is that routines accepted for the library are often difficult to use in a new context. The result is often the growth of a number of subroutine libraries along organizational or functional lines, frequently containing multiple versions of equivalent routines. The fragmentation of libraries defeats one of the primary purposes of reusable code implementation: prevention of redundant development.

#### The challenges

To achieve the full benefits that reusable code promises, a number of difficult challenges will be met. The dominant theme in meeting these challenges is increasingly sophisticated automation of the processes involved in software development. That sophistication can be provided by expert systems that support program development.

The first challenge is to maximize the reusability of any code written. Widely reusable code demands automation in the process of producing code to handle the amount of work to be done and to provide the degree of accuracy required. This automation must perform not only the many tasks taken over by programs supporting systems in the progression from second- to fifth-generation software, but it must also take responsibility for creating code that meets the requirements for successful reuse.

Achieving reusability is usually of little immediate interest to the programmer. He is much more concerned with meeting some current need and is justifiably willing to sacrifice future reusability, and hence future

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## IN DEPTH/REUSABLE CODE

*A further challenge in creating reusable code is providing standardized error reporting. Complex modules are built up of multiple levels of other modules, many of them reusable in various contexts. Noncritical failures may be reported by means of return codes from lower level functions, while major failures must lead to specific abnormal termination procedures.*

productivity, for faster achievement of short-term goals. Programming support systems must help him to produce good reusable code with no delays and minimal — preferably no — extra effort.

The second challenge is to make sure that if an appropriate piece of already written and tested code is available to meet a current need, it will be used. When a programmer is faced with a particular need, the most satisfying way to meet it is to pitch in and do a little trash programming. With the use of ever higher level languages, the human effort required to create a particular piece of needed code is relatively small. The savings achievable by reusing code are large because any given project involves creating a very large number of well-integrated and tested small pieces of code.

In order to achieve these savings, code potentially usable for a particular need must be located quickly and easily, which means it must be carried out completely automatically. The elements of the task include recognizing essential features, locating and presenting to the programmer one or more pieces of code likely to fit the current need and building the selected code into the system under development. For even a small need, the process must be easier than to generate new code.

The challenge of managing a subroutine library involves many difficult problems. The addition of new modules and the evolution of existing reusable code must be both allowed and controlled. As features are added to existing subroutines, multiple versions of a module with overlapping functionality come into being. Records must be kept telling what modules are in use in already constructed systems.

Multiple versions of similar or overlapping modules must be kept available to meet slightly different needs. For example, because of execution speed or size, a currency conversion module that includes a limited number of currencies may be preferable in some circumstances to a version that covers many currencies.

Both versions must be kept available. Correction of a bug in one may be cause to examine the other. Some application systems may be affected by the bug, so that the effort of replacing the older version with the repaired one is not only justified but essential. Another production system using the same module may be unaffected by the bug. If this situation can be verified, then the work and cost of replacing the module in this system can be avoided.

A further challenge in creating reusable code is providing standardized error reporting. Complex modules are built up of multiple levels of other modules, many of them reusable in various contexts. Noncritical failures may be reported by means of

return codes from lower level functions, while major failures must lead to specific abnormal termination procedures. Error and warning reporting from one module to another must be handled in standardized ways so that testing the use of a reusable module requires only testing the

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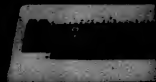
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IN DEPTH/REUSABLE CODE

interface between it and the program using it. The module itself and the lower level modules it contains may be relied on to detect and report correctly error conditions detected at lower levels.

Facilities to meet these challenges will be a part of fifth-generation expert systems that support software development.

**Software engineering**

Workers at the frontier of information systems and software technology are very much concerned with bringing engineering discipline into systems and software development. Much effort is going into making sure that information gleaned at each stage of the development process is properly captured, verified and organized for effective use as

the basis for work at the next stage.

The huge intellectual investments in strategic planning and systems analysis must be preserved for effective construction of the original system or software product. The availability of this information in usable form also has obvious benefits for system maintenance and can substantially extend system life. However, because of the great overlap in the planning and analysis information for interfacing systems, the biggest payoffs occur when this information can serve as a foundation for the development of interfacing and related systems.

A variety of major research and development efforts are attacking information and software engineering at different points and from different directions. One very promising

development area is the generation from design specifications of computer programs that are verifiably correct in the sense that they are known to implement the specifications. The USE.IT system by Higher Order Software, Inc. of Cambridge, Mass., allows an analyst/designer to decompose the process to be performed and the data involved in a hierarchical fashion.

The successive stages of process and data decomposition are performed according to specified rules. The entire decomposition can be checked automatically for consistency and completeness. The resulting lowest level functional primitive operations can be processed automatically to create computer code in any one of several compiler languages. If the specification passes the consis-

tency and completeness checks, the analysis generated code can be relied on to realize the specification correctly.

The USE.IT approach to validating the specification is a powerful attack on specification errors that involve faulty data interactions. The analysis phase tracks variables from one end of the program to the other to ensure that each variable is defined and given a value prior to being used as an input to a calculation or decision process.

The validation provided by USE.IT is limited to completeness and consistency. Successful validation provides that the resulting program can be expected to execute successfully and will do what the specification said it should do. Whether the program will do what the analyst expected it would is not the same thing, and whether it will do what another user expects is still less certain.

Achieving this level of correctness is the objective of formal correctness proofs. These make assertions such as: "If the input data submitted to program XYS meets specific requirements, then the program will terminate with the desired result." Consider an internal sort program to be used by an on-line transaction program. Several conditions must be satisfied for the program to work properly: The size of the table to be sorted cannot exceed a maximum limit; the size of each table entry must be within another maximum; the table size must be a multiple of the entry size; and the sort key size cannot exceed the entry size.

If all these conditions are satisfied, the program will, without exception, terminate with the table entries in sorted order. An experienced or cautious programmer will include in the program tests for each of the requirements before starting the sorting process. Program code such as this, called guard code, has some drawbacks.

Detection of invalid conditions that waits until execution time costs valuable effort and delay just at the most critical time, namely, when the results of the information processing are needed. The execution time for guard code, even when no errors are present, can be significant, particularly in large modules or frequently executed lower level ones.

Well-managed reusable modules accessible to a program development system that does interface and integration checking can provide two major benefits: faster execution and faster development. Less code is necessary to do the same job, and less effort goes into producing the program.

The time required to prove a program correct is related to the number of variables involved. A reusable code module offers the advantage of reducing the total number of variables involved in the correctness check since the local variables of the reusable module do not need to be considered. Only the input and output variables of the reusable module have significance in the proof process if the module itself has been previously verified. A verified module can be used within other routines without incurring the overhead of reverification. Only the guard conditions need to be checked to fit the module into a new situation.

In contrast to software engineering, which is largely concerned with

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creating correct code based on a previously good specification, information engineering is aimed principally at accurate and rapid recording and checking of strategic planning and analysis data. The ultimate goal includes automatic program design, based on adequately detailed and checked analysis information, with the design in turn supported by automatic code generation. Information engineering has been the target of university research projects for many years. It has become the object of much attention in consulting firms more recently.

The amount of computer-executable code that already exists is staggering; the backlog is larger still, and

most subsets of the information in a variety of forms, including text, diagrams and matrices.

The one thing that all of these efforts have in common is that once the body of specification information has been mastered for an information engineering project, it must be possible to produce the required program code automatically. When efforts are successful to move the point where automation takes over in software development back from the design/construction interface to the analysis/design interface, the leverage provided by automatic program construction will be still further magnified.

The sheer volume of code to be produced makes it imperative that code production efficiency be a major concern. Code must be created

and managed so that any routines created are made available to the widest possible circle of users.

## Fifth-generation development

One of the products the Japanese intend to produce is a result of their fifth-generation efforts is a complete expert system — hardware and software — aimed for use by a single individual. The goal is to produce rapid personalized support for knowledge workers to improve their productivity. The benefits to the workers include greatly increased job satisfaction and opportunity for growth. The push for a personal-scale knowledge machine is partly a consequence of the problems of data integrity and concurrency that plague distributed computing, particularly micro-based activities.

In the U.S., the current emphasis in fifth-generation development seems to be more on the production of large knowledge bases and expert systems that can make the power of the stored knowledge available to many individuals in large organizations. Information system maintenance is just one of the many problems that are susceptible to this method of attack. However, it is one that is highly leveraged, since knowledge base handling systems and expert systems using knowledge bases for information systems development must themselves be developed before the goals of fifth-generation software can be met.

The components of a fifth-generation development system are a verifiable specification language, a library management system, a knowledge

*The sheer volume of code to be produced makes it imperative that code production efficiency be a major concern. Code must be created and managed so that any routines created are made available to the widest possible circle of users.*

the amount to be produced in the next decade is mind-boggling. This realization has motivated firms in such diverse industries as computer manufacture, hydrocarbon processing, software creation and electronics to undertake major projects aimed at mastering information engineering to break the software production bottleneck. Different projects emphasize different aspects of improving software systems productivity, usually based on the recommendations of different experts about how to convert software development from an individualized creative endeavor to a systematic engineering activity.

One approach emphasizes computer support for producing a limited number of different kinds of diagrams that help users specify, visualize, organize, review, complete and document the basic information for program construction. Another project concentrates on capturing specifications in a form suitable for automatic code generation. A third begins with an architecture that relates different phases of systems development activity, to be fleshed out with a variety of alternatives for doing the work involved in each development phase.

A fourth concentrates on producing a facility for storing all of the diverse body of knowledge that is involved in producing information systems, to be supported by numerous processors that accept and pre-

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## IN DEPTH/REUSABLE CODE

base, a command-level analyst interface and an inference processor.

Fifth-generation specification languages will continue the present trend in the direction of nonprocedural languages. The tasks of finding out all that must be known to produce software and of recording this information so it can be automatically organized and processed by the expert system are complex.

The fifth-generation development system will take an active role in information processing analysis and target software system design. Module selection and specification verification are important elements of this role. The specification language allows an analyst to communicate readily with the knowledge base in terms of process flow, data structure and logical requirements.

After the specifications for a system have been developed and communicated to the knowledge base, they are combined with other information from the knowledge base to support construction of the target system. Tapping the knowledge base to identify candidate reusable code and to select the most appropriate modules requires comprehensive information about available modules. Important parts of this information are the conditions that must be satisfied at the time a reusable module is invoked and the conditions that will be satisfied when a reusable module terminates. In describing inputs to reusable modules, the weakest, or least restrictive, condition on the input data that will ensure successful execution is used. The weakest precondition is preferred over stronger

restrictions since minimum testing and minimum module-specific preparation will be required to meet the needs of the weakest precondition.

In describing outputs, we are interested in the strongest postcondition, since this is the most restrictive statement describing the data after completion of the program. The knowledge base associates module names, locations and statements of weakest precondition and strongest postcondition.

The command-level interface assists the analyst by managing, supporting and simplifying access to the knowledge base, inference engine and specification language.

The inference engine combines user knowledge of requirements with the knowledge base's description of capabilities of available reusable

modules. The expert system built on the inference engine and knowledge base presents what can be deduced about the specification and identifies and requests information required to complete it. With this achievement, the fifth-generation software development system will have taken over software construction responsibility in toto, while the analyst is freed to concentrate entirely on issues of usability and architecture.

Fifth-generation system development methodology has a number of implications. Data processing personnel requirements will change, as they have been changing steadily since computers were invented. Cap-

*The fifth-generation software development system will take over software construction responsibility in toto, while the analyst is freed to concentrate entirely on issues of usability and architecture.*

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ital expenditures will continue to rise. Organizational structures will continue to evolve to take advantage of emerging technology. The role of the traditional programmer will shrink as "smart tools" increase the productivity of individual people.

Three classes of program developers can be identified. There will be specialists in non-procedural languages and prototyping systems who concentrate on quickly producing new information systems — these have been christened "data processing acrobats." There will be the supporters of the expert system and the knowledge bases used for information system production. The responsibilities of this group will include creation and extension of large libraries of reusable code.

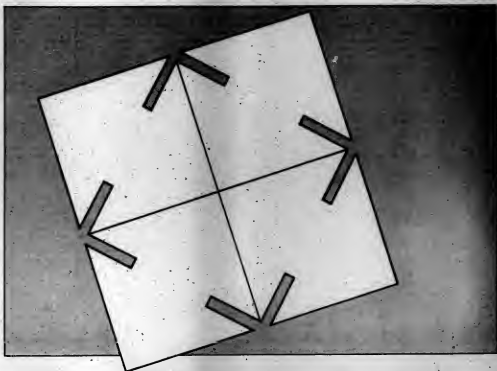
And there will be the bulk of the users of these expert systems and knowledge bases. This group corresponds to the majority of the current programmer/analyst population. Analysis work will predominate over programming in the daily activities of this large group. Fifth-generation tools will provide the needed program construction support, and one of the major elements of this support will be effective automatic management of reusable code.

### About the authors

**F. Arnold Romberg** is an independent consultant based in Dallas. He has been a computer systems professional since 1954. In the course of employment by a major oil company, a management sciences and computer software firm and an electronics manufacturer, he has worked with many kinds of software in program development, mathematical programming, corporate planning, manufacturing and information engineering. He has taught systems programming, data base management and system analysis.

**Alan Thomas** has worked in the industry for nine years as analyst, project manager and supervisor. He has been with *Thomas Instruments, Inc.* for the past six years and is now a technical consultant at *Pwr Services, Inc.*, specializing in data base management and development technology.

## IN DEPTH



## Practical data sharing

***Disillusionment with the "universal corporate data base" concept caused a swing to DBMS as an access method. But between these two extremes there is a practical alternative — data sharing.***

By V. Venkatakrishnan

Data is said to be shared if its definition and values are stored in only one physical location (record, file, data base) in the company. Shared data is accessed and updated by any number of applications without the need for duplication or redundancy. Data sharing is the strongest thrust behind the concept of data base management systems (DBMS) and is or will be inevitable for the following reasons:

- It reduces the number of batch programs to be developed and executed to interface applications that access common data. This reduction is important because the batch window is steadily decreasing because of growing demand for on-line operations. A side benefit is the overall increase in application productivity resulting from the decrease in the number of programs to be developed.

- It improves the validity of information by making current data available promptly.

However, because of the limitations of commercial DBMS software and the hardware limitations of today's processors, an idealistic pursuit of the preceding definition of data sharing will result in unmitigated disaster. Perhaps it was such a pursuit that led to the rise and fall of the "universal corporate data base," which was supposed to contain all the data the enterprise

## IN DEPTH/PRACTICAL DATA SHARING

would ever need. The disillusionment created by this rather impractical approach caused the pendulum to swing to the other extreme, namely, use of the DBMS as an access method with disregard of data sharing. This approach is as cost-effective as using a large tractor trailer for daily commuting.

Problems with the ideal are operational in nature and fall into four ma-

for categories — application development, production migration, change control and performance.

**Application development:** Application development normally goes through several phases, which may be generically identified as feasibility, general design, detailed design (programming), unit testing and system testing. A vital ingredient in this process is the availability of test data. In

the traditional nonsharing environment, the process is relatively straightforward. Test data is generated from scratch or extracted from existing files. The criteria for test data generation can be simple or complex, depending upon application requirements. The stability of test data can be important to the development effort. All these factors are controlled effectively and easily in a non-sharing environment.

On the other hand, when data is shared ideally an unlimited number of applications must use common test data, which may be changed in unpredictable ways. This situation lengthens development time, thus aggravating the application backlog.

**Production migration:** Applications are individually moved into production, whether data is shared or not. There are widely accepted procedures for doing this

in a nonsharing environment. These procedures are usually based on moving programs and data between libraries. With shared data, it is possible that one application wants to establish pointers to data and another change the contents of a record that is used by an existing application already in production. This situation, although avoidable to some extent, soon gets out of hand in the ideal data-sharing environment.

**Change control:** It is a fact of life that the needs of the business and application will change continuously. Establishing priorities and schedules for these changes can be an impossible challenge to the best data base administrator if data sharing is not carefully planned and controlled.

The worst scenario is cascading of these changes or the domino effect, where one change implies another and so on. This effect will bring all data base operations to a standstill.

**Performance:** By far the greatest performance killer is the high number of I/O requests demanded by transactions. An offshoot of this is the record contention, where several users attempt to obtain a bottleneck record, which may not be technically deadlocked for the DBMS software to detect. Since the ideal data-sharing environment does not allow any data redundancy at all (other than certain primary keys), both these conditions can occur and degrade performance rapidly.

A familiar situation is that data frequently needed on-line by a new application may be buried several layers down a chain or may be scattered all over the existing production data base structure. Both contribute to excessive I/Os. Further, with widely scattered data, there is a good probability of running into record contention.

#### Effective data sharing

There is little doubt that the future direction of the data base is relational. However, today we do not seem to have truly performance- and integrity-oriented relational DBMS capable of handling unlimited numbers of relations in third normal form.

The majority of data base professionals believe that advanced hardware such as associative memory and parallel processors will be needed to implement efficiently fully relational systems for large concurrent transaction and query processing environments (W.H. Inmon, CW, Nov. 25, 1983). On the other hand, some experts contend that there is no reason why relational DBMS, at least in theory, cannot perform as well as any nonrelational DBMS using perfectly



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## IN DEPTH/PRACTICAL DATA SHARING

traditional 370-type hardware (C.J. Date, CW, Feb. 13).

The experience of large MVS users with IBM's DB2 will settle this argument over the next five years or so, for it will take at least that amount of time for a major product to mature and win widespread acceptance. Even if DB2 proves to be as efficient as, say, IBM's IMS or Cullinet Software, Inc.'s IDMS, a number of users

must continue to operate in a nonrelational environment for quite a while, since switching DBMS strategy is a monumental task, extract facilities and interfaces notwithstanding. Effective data sharing will help users reap the rewards of proven information resource management (IRM) methodologies in both relational and nonrelational environments.

Effective data sharing specifically addresses the

following aspects of data sharing:

1. Sharing data definitions.
2. Criteria for sharing data.
3. Implementation.

The data definition (sometimes called "meta data") consists of the data name, a standard abbreviated name, length, storage characteristic (numeric, alpha), clear business description and special classification and notes, if

any. Data definitions are centrally stored in the data dictionary managed by data administration. These definitions constitute the first step in subject data modeling and should be shared across all application systems of the company. However, because of existing systems, it is likely that there will be several versions of definition for the same data element. The number of such versions decreases as more and more

functions are taken through data modeling and implementation.

The strategy of the information cycle (Figure 1) linking the end user, data definitions, data dictionary, data model, data base and applications is the key to successful data sharing. For, we cannot share something about which we know nothing, and all attempts to share data without a formal sub-

*Effective data sharing will help users reap the rewards of proven information resource management (IRM) methodologies in both relational and nonrelational environments.*

ject data model are bound to fail.

#### Business criteria

The subject data model must be studied in conjunction with business processes and functions to determine the following factors:

1. Is the business type of the new application substantially the same as the existing application(s)?
2. Are the hardware and software environments of the new application the same as those of the applications it may share data with?
3. Are security requirements of the new application parallel to those of its shareable counterpart?
4. Does the subject data model reveal any tight associations between the entities of the sharing applications?
5. Does the model indicate associations between record types of potentially large volumes?

We distinguish between two types of data sharing — passive and active. Passively shared data is updated by only one application (Figure 2). Other applications that share this data only access it. Common examples of passively shared data are pseudo entities (tables) and certain globally used data elements (name and address of employees, for example).

For instance, in Figure 2, business type 1 may represent the principal accounting functions responsible for controlling the definitions of company, department, cost center and so on, while business type 2 may represent a set of investment functions that must use the definitions.

Passive sharing is to be encouraged, because the productivity gains resulting from reduced maintenance usually outweigh the cost of its implementation. Actively shared data, on the other hand, is closely bound to two



## IN DEPTH/PRACTICAL DATA SHARING

**Record volumes have a direct impact on performance and reorganization requirements. If the associated entities in the actively sharing applications have high record counts (on the order of a few hundred thousand), then logical sharing should be considered.**

or more applications through DBMS pointers or program logic and usually are updated by these applications.

Active sharing involves more work for the DBA and application developers and deserves close scrutiny. The presence of active sharing indicates that the corresponding business functions are interdependent. If the business types serviced by two applications are quite different, then data sharing, if it occurs, will be passive.

The second question addresses an issue that is becoming increasingly important with the advent of microcomputers. In the simplest case, all applications that potentially share data operate in the same hardware/software environment (for example, using an IBM 308X running MVS and with S370-type terminals). However, it may be necessary to implement part of a subject data model in another environment such as VM, mini or microcomputer because of the intended use of the data. For example, data entry and accounting functions may reside in the tighter MVS environment, while financial modeling, projection and external data may reside in the VM or micro environment. In this case, proper bridges between these environments must be built to enable transmission of necessary live data.

As a rule, all operational data should reside in the same environment. Even in this case, data may have to be distributed because of volume or processing considerations. The two known ways of distributing data are partitioning and replicating. Strictly partitioned data can be physically shared, while replicated data is only logically shared and involves interfacing procedures to maintain synchronization. A combination of the two types is typical, with predominance of one or the other. Today's large-scale distributed data strategies rarely involve concurrent updates, but use store and forward instead. Whether data is partitioned or replicated, it introduces additional considerations in data sharing. For instance, if applications in widely scattered geographical locations want to share data, it may have to be replicated because of communications costs.

Security requirements of applications with potential for data sharing must be carefully analyzed. It is possible for the sharing applications to have opposing security requirements. In this case, the more stringent requirements should be applied to shared data. The DBMS or other software must be capable of providing the desired degree of security at a record or even data item level.

The degree of sharing between two applications is indicated by the association between their entities in the subject data model. The more such associations, the higher the degree of sharing. Currency requirements of the sharing entities are important. If entity B of application 1 is associated with entity C of appli-

cation 2, then we should determine how current C expects B to be and vice versa. If the currency required is instantaneous, both applications must actively share data. If one entity can lag behind the other by a day or so, then data may or may not be actively shared, depending on other constraints.

The last but extremely important consideration is the record volumes, because they have a direct impact on performance and reorganization requirements. If associated entities in the actively sharing applications have high record counts (on the order of a few hundred thousand), logical sharing should be considered.

**Implementing effective sharing**  
The key to effective data sharing is planned and controlled data.

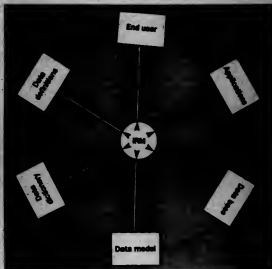


Figure 1

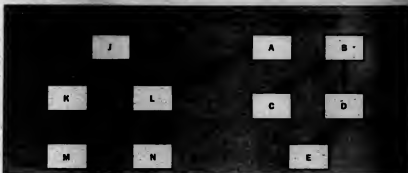


Figure 2

# David

## Recommends The Diablo 630 Series

David Jamison Carlyle recommends the Diablo 630 Series.

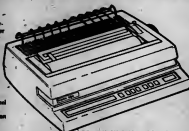
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## IN DEPTH/PRACTICAL DATA SHARING

*If data is shared between two or more applications, and users from different departments may have to participate in extensive system testing. Management commitment and a relatively high level for the data base administrator in the organizational hierarchy are necessary to bring about this cooperation between user departments.*

redundancy. The first step is to construct the subject data model, which reveals the associations between the entities. This model may already exist, since by definition it encompasses more than one application. Data administration and the data base administrator carefully evaluate this model for potential sharing. The ideal answers for effective data sharing are "yes" to the first four questions and "no" to the

last question.

**Real-life applications,** however, rarely lend themselves to such clear-cut answers. Each criterion must instead be treated as a topic for analysis, and a weighted answer must be arrived at. For example, the term "high volume" may have different connotations for different applications, depending upon their operating environments and expectations. Data sharing is decided upon

when data administration and the data base administrator are reasonably sure that the issues raised can be effectively managed. In other words, data sharing is a deliberate and planned process and does not happen by default.

The type of sharing to be implemented, passive or active, is to be determined now. The simplest kind of passive sharing is "look-up processing," which involves periodically accessing data from another application. Essentially, these are table searches, and the applications can be truly integrated with a minimum of effort.

To implement active sharing, there are two techniques. If the volumes of the participating records are not excessive, a direct pointer relationship can be established. Otherwise, the key of the higher level record can be made into a secondary access path to the lower level record. This indeed makes the sharing logical rather than physical. Logical sharing involves program logic to keep data in synchronization. In either case, choice of physical areas, data set groups and the like must be reevaluated for ease of reorganization.

In a shared environment, the test data must be maintained centrally for those applications that follow the information cycle. While the data base administrator cannot be expected to do data entry, he may use utilities to generate adequate test data. Another data-sharing-related issue is the final system testing.

If data is shared between two or more applications, end users from different departments may have to participate in extensive system testing. Management commitment and a relatively high level for the data base administrator in the organizational hierarchy are necessary to bring about this co-operation between user departments. The price for not implementing such joint testing can be high.

Once data sharing is implemented, it is important to follow the direction of the arrow in the information cycle (Figure 1) to carry out any change control procedures. This will ensure that the original plan for the shared data continues to be effective.

### About the author

V. Venkateshkrishnan is data administrator in the Financial Division of Aetna Life & Casualty in Hartford, Conn. His responsibilities include building logical data models to satisfy a variety of business needs, integrating logical and physical design in a multiple DBMS environment and providing data dictionary and application development support.

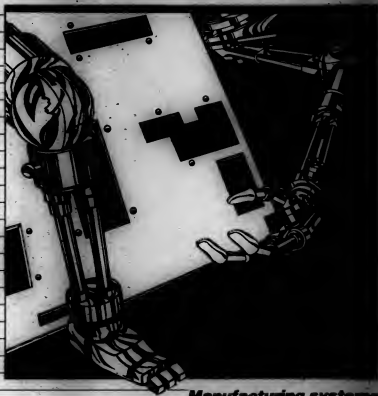


# The Proven Bridge from IBM to Your Graphics System



# SPECIAL REPORT

*The next step*



*Manufacturing systems*

*March 26, 1984*

**COMPUTERWORLD**  
THE NEWSWEEKLY FOR THE COMPUTER INDUSTRY

# Economic forces rock industry's foundation

## Management must master technology-driven production systems

By A. J. Pincus

Special to CWT

It is called everything from the "New Industrial Revolution" to the "Next American Frontier." Whatever the label, the fact is that the economic forces of global competition and dwindling productivity are driving industry to alter its basic structural foundation.

In basic as well as high-technology industries, management is being pressured to breathe new life into the corporation by developing manufacturing expertise. The result, for well-run companies, will be a completely new business orientation. Growth will stem from mastering the management of technology-driven production systems, which include information processing systems, factory floor hardware and software and labor.

Several developments will result as these systems evolve:

■ Manufacturing automation markets will grow significantly as industries invest heavily through the remainder of this decade.

■ Effective information management will become the most critical concern of the evolving corporation.

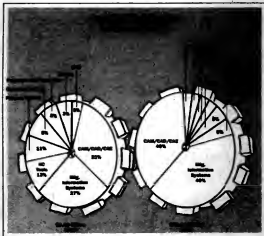
■ To meet this information management requirement, all automation activity will be coordinated and, ultimately, integrated. There will also be a merging of traditional DP, engineering and manufacturing functions.

Before discussing the factory automation marketplace, it is important to discuss the management foundation required for effective implementation.

A new breed of management is evolving, and the use of automation is playing a key role in this transition. Automation itself, however, has little to do with the problems that industry is addressing. In discussions of factory automation, lack of technology is commonly and incorrectly referred to as the preeminent problem.

The real problem is a loss of competitive advantage in the marketplace, which is caused by management's inadequate response to the changing environment, not by a lack of automation.

In the automobile industry, for example, Japan did not gain its advan-



tage through the use of automation. The fact is that Japanese automobile factories do not have more automation in place than competing American facilities, yet they have outperformed American manufacturers in virtually every productivity and quality-related category. These gains are attributable to superior management techniques, not automation.

Automation is a tool, nothing more, and, as with all tools, will perform only as adeptly as the craftsman using it. For well-run companies, automation represents an opportunity. If used effectively, it will lead to improvements in productivity, efficiency and quality. If it is seen as a substitute for good management, however, then its use will actually prove to be more harmful than worthwhile. If a poorly managed firm does not deal with its basic management problems before bringing in advanced technology, it will only intensify its woes.

International Data Corp. has estimated 25% to 26% compound annual growth for the overall manufacturing automation market during this decade (see chart above). These technologies are segmented into four ma-

jet market areas:

■ Computer-aided design and manufacturing (CAD/CAM) systems: product design and engineering applications.

■ Manufacturing information systems: applications related to the planning, control and overall coordination of the manufacturing process (MRP II, data base management systems, decision support systems).

■ Industrial control systems: hardware and software dedicated to the control and monitoring of factory floor activity (programmable controllers, numeric control, process control).

■ Flexible production systems: programmable automation dedicated to the actual production process (robots, automated handling and inspection).

The market segment growth shown in the above chart, beyond revealing the automation vendor's opportunity, accentuates the needs of the user community. The lion's share of each pie chart is represented by products within the CAD/CAM and manufacturing information systems segments — essentially the engineering, planning and control components

of the manufacturing environment (from 50% of the total market in 1980 to 80% in 1990).

This is not to say that the markets for factory floor flexible production systems do not represent areas of opportunity, but rather that the focus of management restructuring and reorganization will have to take place at the top end of manufacturing. In other words, the bulk of manufacturing automation is and will continue to be software that is employed by the management and professional sector.

Installation is easy part

Tackling the technology implementation problem will not center on the implementation of hard automation on the shop floor. In fact, once needs have been determined and the proper management control functions have been set in place, installing the hardware is the easy part.

The question for firms considering automation should not be, "How many robots should I buy?" or "How do I implement a local-area network in a heavy industrial environment?"

These questions will ultimately require an answer, but if a company has not first addressed the No. 1 question, "How will I address the information management problems inherent in using automation?" then it is not thinking in the right direction.

Building information-based manufacturing systems should be similar to building MIS organizations. For this reason, DP's involvement may prove critical to the ultimate success of this effort (building data base management systems, planning for software integration).

Product design engineering and manufacturing engineering groups, often isolated from one another, must begin to coordinate their activities. Essentially, before an integrated corporate system can work, all automation groups must be tied together, physically as well as conceptually. And as difficult as these tasks may seem, meeting the challenge is critical to success in an increasingly competitive global marketplace.

*Priscilla is program manager of the Computer Integrated Manufacturing Service for International Data, a market research firm based in Provington, Mass.*

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# Automation turns gears of turbine assembly

By Mark Anderson  
Special to C&E

WINSTON-SALEM, N.C. — From the management information systems used to track parts, tools and raw materials, to computer-controlled machine tools and robots, a plantwide system of computers assists in the everyday operation of Westinghouse Electric Corp.'s plant here.

The Winston-Salem plant is responsible for the manufacture of turbine components used in large steam turbines for power generation. These turbines range in capacity from 100 megawatts to over 1,300 megawatts. After the individual components are made at this plant, they are sent to other Westinghouse plants for assembly.

Among the turbine components made in North Carolina are fixed vanes, rotating blades, nuts, studs and other assorted blending products. Components and subassemblies and valving products, among others. Parts for new power plant sites as well as for service work at existing generating stations are made here. In addition to these traditional steam turbine components, the Winston-Salem plant has been involved in several other areas, such as general machining on a job shop basis, utilizing some of the special machine tools already in existence at Westinghouse. This plant is also involved in the manufacture of subassemblies for robots marketed by Westinghouse Unimation, a manufacturer of robotic systems.

The coordination of all of these manufacturing and assembly efforts would not be possible without computer assistance in several areas.

To understand the computer operations of the Winston-Salem plant, one must begin with the computer terminals used. Westinghouse has standardized one generic terminal style, utilizing the ANSI 3.64 protocol for all applications. This is a key concept.

When combined with a centralized integrated voice/data phone system from Rolm Corp., a user at any of these terminals is able to establish a connection with over 50 different computer systems located both in the plant and at other sites. These systems include an IBM 4341 Model Group II and a Sperry Corp. 1100/806 located inside the plant, and IBM

3081, 3085 and 3084 mainframes located at the Energy Systems Designing Center in Pittsburgh, Pa.

A Control Data Corp. 7050 and a Cray Research, Inc. Cray 1 are also available for engineering use by the Winston-Salem plant. Additionally, Digital Equipment Corp. VAX systems are located at Carnegie-Mellon University in Pittsburgh, with which the plant is conducting several research activities.

The IBM 4341 Model Group II performs all of the traditional data processing applications at the Winston-Salem plant. A full inventory system, a purchasing system, accounting functions and a homegrown material requirements planning (MRP) system are all operated on this machine.

Acting as a peripheral to the IBM 4341 is a Data Pathing, Inc. Model 4122 system for factory data collection. Employees use time and attendance cards located throughout the factory to gather information on every operation in the plant.

These time statistics are recorded and fed back to the 4341, where they are data-reduced and stored in a data base. This data can then be used in the calculation of costing rates, inventory tracking and work-in-process monitoring.

Additional CRT terminals located in the on-floor supervisors' offices are used by hourly workers and supervisors to monitor job progress. Using the various programs that access the data bases, the supervisors can determine the work load on each of the machine tools in their areas and then determine the next task to be performed. In addition, supervisors are able to monitor their groups' productivity and approve time-clock figures for their employees.

The second mainframe located at the Winston-Salem site is a Sperry Corp. 1100/806 system. The same generic terminals used to access the IBM are capable of accessing the Sperry computer. This system is dedicated to the support of manufacturing operations.

Using Mapper software from Sperry, Westinghouse employees are able to access several data bases containing information on machine tools, operation times, production schedules, cutting-tool designs and parts geometry.



The numerical control programming department resembles the major user of the Sperry 1100. The Winston-Salem manufacturing plant contains 60 numerically controlled machine tools. Each of these machines requires a numerical control program to guide the cutting tool through the complex motions needed to manufacture a turbine blade.

## Draw-type programs

Part design data bases, exchanged between the manufacturing plant's Sperry 1100 and the engineering department's CDC Cyber 845 computer, enable the parts programmers to complete large numbers of error-free numerical control programs. Further assistance to these programmers is available on the plant's Computerization Corp. Cadds 4 computer-aided drafting system.

Parts design data can be communicated from the Sperry mainframe to the Computerization system to allow automated program generation for several different types of gauges used for quality control. Here, the parts dimensions are used to create a tool-design drawing automatically. The tool-designer then adds the required manufacturing detail information and tool room instructions to create a final drawing and a numerical control parts program. Other designers use the system to provide drawings, machine setup information and geometry verification data for the numerical control programmers.

Direct numerical control is made

possible with a Westinghouse-designed computer system called a machine interface unit. The unit provides the required interface functions to link either the Sperry or the IBM mainframe with the numerically controlled machine tools. Each of the 60 numerically controlled machine tools located at the Winston-Salem plant is equipped with a machine interface unit to eliminate the need for the more traditional paper tape.

To guarantee that parts will meet all of the customer's requirements, a number of quality control devices are employed, including two DEC PDP-11-controlled coordinate measuring machines. The Pautocheck system feeds its data points through a PDP-11/23 to a VAX-11/750 for further analysis and reporting. A DEA system uses a PDP-11/34 for measurement verification and communicates directly with the Sperry 1100 for coordinate data transfer.

The systems at Westinghouse are used for everything from typical data processing to CAD/CAM applications. Computers have been integrated into an ever-increasing number of machine tools in the form of numerical controls and programmable controllers. The increase in productivity gained from using these computers enables manufacturing plants such as Westinghouse to make the highest quality products at the lowest possible cost.

Anderson is a data processing electronics specialist at Westinghouse in Winston-Salem, N.C.

## Three I's of turbine CAD/CAM

ORLANDO, Fla. — The engineering computer services department for the Steam Turbine-Generator Division of Westinghouse Electric Corp. has adopted "three I's" as guidelines to computer-aided design and manufacturing (CAD/CAM):

- Interactive computing and graphics.
- Interfaced software and data bases.
- Integrated design-manufacturing functions.

"These are the three disciplines we concentrate on in building CAD/CAM techniques for production of

the blades used in our steam turbine generator units," explained John Petras, manager of the division's engineering computer services located here.

Turbine blade design is extremely complex and requires great precision from the earliest stages to ensure efficient manufacturing and on-site operation. A single turbine generator unit has thousands of blades ranging in size from one in. to 44 in. Each row of blades varies in design to produce the required response to the incoming steam.

See BLADE B/S/4

## SPECIAL REPORT

## BLADE Item 25/3

Other than blade geometry design, engineers must analyze steam conditions, vibration phenomena, the relationship between many different blades and the balance factor when blades are inserted on the rotating disk. Confronted with all these variables makes simulations an important part of the design task, Petras noted. A broad range of simulation programs was needed to ensure that the designs will result in parts and assemblies that will perform safely and efficiently, he said.

The Steam Turbine-Generator Division initiated its CAD/CAM activities about four years ago. Since then, it has installed Control Data Corp.'s Integrated Computer-Aided Engineering and Manufacturing (Icom) system as the cornerstone for its CAD/CAM activities. The application program operates on a Control Data Corp. Cyber 845 mainframe in Monroeville, Pa.

By using a shared data base, Westinghouse facilities in East Pittsburgh and Lester, Pa., Orlando, Fla., and Winston-Salem, N.C., can access and work on the same up-to-the-minute engineering drawings. Data base development is a primary concern as the Turbine-Generator Division moves into integrated design and manufacturing.

## Volume of data

"Over the years, we accumulated volumes of engineering data that were scattered throughout the engineering department. It is important to have one central data base and to eliminate redundant data, which is expensive to store, and to make sure that design engineers have access to the best possible information," Petras said.

To achieve data base quality, Westinghouse applied CDC's information analysis methodology to formulate the data base approach. This procedure involved precise input from all users concerning the meaning of the information in the data base. A model of the proposed data base was run on the computer to determine if all user needs would be met with the proposed structure and content.

As a result, the engineering computer services department was able to demonstrate to potential users exactly what the data base would provide before additional dollars were spent on development.

With the data base structure and content in hand, Westinghouse then used CDC's DMS-170, a data management system with a modular structure and data independence, to handle the many updates and changes that characterize an engi-

neering design environment.

The next major project for engineering computer services was to integrate the engineering and graphics data base through another system provided by CDC — the Engineering Data Library. This program allows parts geometry and other engineering data to be stored in a single data base.

This capability allows engineers, manufacturing per-



Individual turbine blades.

sonnel, managers and administrators to access data in a common file, Petras said. "Information will be retrieved,

added and deleted interactively or in batch mode," he said. "We also will get statistical and accounting data."

The wide selection of engineering software developed by Westinghouse over the years for batch processing of design data continues to be used in the CAD/CAM environment. Those programs have been made compatible with Icom, thus enabling Westinghouse to protect its software investment.

# SIX REASONS WHY CINCOM'S MRPS IS THE SUPERIOR SOFTWARE SOLUTION TO YOUR MANUFACTURING CONTROL PROBLEMS.



## SPECIAL REPORT

## Computers link robot teams

WESTON-SALEM, N.C. — Westinghouse Electric Corp. uses computers on the shop floor of its turbine manufacturing plant here to tie together several different machine tools, creating a team of machines from the individual units.

One such manufacturing

cell has been in operation for over two years. The disphragm blade cell links two standard machine tools to a Westinghouse Unimation Model 2000 robot. The raw material used in this process is a special preshaped bar stock. The robot accepts incoming pieces from an inclined plane



and passes them to the first machining tool, which removes material from the sides of the turbine blade.

From there, the robot passes the parts to a slotting machine. A groove is placed on the part's end to serve as a locating point for subsequent manufacturing operations. A grinding operation is included as necessary to remove burrs caused by the milling and slotting operations. The finished parts are removed from the slotting machine by the robot and placed on the output inclined plane.

There are two other manufacturing cells currently under development at the plant here. A forging cell integrates two robots, a cropper/stamper, a rotary hearth furnace, two Computerized Corp. systems and an open die preform swaging machine.

## Cylindrical billets

Cylindrical billets are located by one of the vision systems, acquired by a robot and placed in the furnace. After the billets reach a temperature of approximately 2,100 degrees Fahrenheit, the robot passes them to the swaging machine. There they are formed into a shape more suitable for the subsequent precision forging process. The second robot accepts the preformed parts and transfers them to the cropper/stamper.

This machine first trims off the small piece of scrap metal from the part's end and then stamps a three-character batch identification code. The robot then moves the part to the final machine in the cell, the vision-based gauge. This device reconstructs a three-dimensional image of the part under study from a series of multiple views.

Coordinating the interactions of these computer-controlled machines requires yet another computer. In this manufacturing cell, a Digital Equipment Corp. VAX-11/760 is used as the host computer.

The second manufacturing cell being developed is a system for sharpening turbine blades. The sharpen operation is the last process before finished blades are shipped. The cell combines a robot, a computer-controlled sharpen machine and a vision-based loading system.

Under guidance from the vision system, the robot is able to pick up randomly stacked blades from one of the standard materials-handling carts. The blades are then placed inside the sharpen machine. Completed blades are then removed by the robot for packing. The host computer for this cell will be a DEC PDP-11/23.

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## Churning market moves dairy to first Stratus system

LYNN, Mass. — Like any user, West Lynn Creamery wanted a computer system that it could milk for all it was worth. West Lynn was not pleased with the arrangement it had — the service bureau it used was starting to make noises about increases in its work load.

That increased work load was caused by West Lynn's growth, and Jack O'Neill, manager of information systems, saw that his company would have to make a change.

West Lynn Creamery has some 6,000 customers, about double the

number it had nearly four years ago when the company bought its first computers, a pair of Nindorf Computer Corp. Nindorf 600s. Today, the creamery handles 130 truck routes with about 20,000 sales transactions and 5,000 inventory transactions every working day. Losing the services of its transaction-processing computer for even 10 minutes would be "a disaster," O'Neill said.

Fumcon Associates, Inc. of Westford, Mass., helped West Lynn ease its way into computerization four years ago by developing a system for the Nindorf machines that printed load sheets for each truck route. "That was just a step to get us off writing manual load sheets; it was an interim step," O'Neill said. "Our long-range plans were to get delivery tickets printed for each individual customer and to balance out drivers as they came in off their routes. That took a year and a half."

For the better part of that year and a half, the company continued to send magnetic tape to a service bureau to create bills. Meanwhile, the company's customer base was growing at a rapid rate. "By the time we were live with this system, we had already outgrown it, so we decided to go out and see what else was available. We needed a faster, more reliable system," O'Neill said.

### Work load too heavy

Around this time, the service bureau began sending signals that the company's work load was becoming more than the bureau could handle. "Our first inclination was to go for a mid mainframe like the one the service bureau used so there would be no conversion problem, but we were kind of taken aback by the price," O'Neill said.

Together, West Lynn and Fumcon evaluated computers made by Prime Computer, Inc.; Data General Corp.; IBM; Sperry Corp.; Tandem Computers, Inc.; and Stratus Computer, Inc.

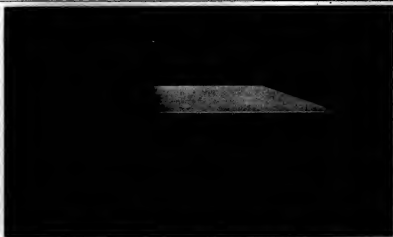
In February 1982, Stratus Computer was a start-up company just emerging from its research and development cocoon with a hardware-based approach to fault tolerance. West Lynn bought the first system that Stratus sold.

The clincher for West Lynn was the fact that Stratus offered fault tolerance and "did everything with hardware," O'Neill said.

Stratus puts two complete processor boards in a cabinet roughly 2 ft wide by 4 ft high. There are also two boards for controlling memory, two for disks and two for communications between computers. Each board includes comparative circuitry that detects errors and takes the board out of service when they occur. Operation of the system continues on the board's twin.

If a board fails, the computer automatically dials the telephone number of the Stratus Customer Assistance Center in Natick, Mass. There, another Stratus computer takes the call and displays on a terminal screen the serial number and location of the failed board and a diagnosis of the problem. Stratus then ships out a new board via overnight courier.

See BOARD SR/S



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# Materials tracking speeds Apple's production

## Repetitive process manufacturing facility dedicated to Macintosh

FREMONT, Calif. — To meet the anticipated demand for its new Macintosh computer, Apple Computer, Inc. is producing the microcomputer here in a repetitive process manufacturing (RPM) facility.

The facility is dedicated exclusively to Macintosh production. It was designed around the concepts of zero inventory and just-in-time materials management, in which Sunnyvale, Calif.-based NGA Corp.'s Maczmax manufacturing and financial software system plays a pivotal role.

In February 1983, Apple — a long-time Maczmax user — asked The Systems Practice, a Campbell, Calif.-based consulting firm specializing in Maczmax applications, to develop the materials tracking system that Apple would use in the new Macintosh production facility.

The system would be able to calculate materials usage and replacement requirements by workstation and shift; to identify potential materials shortage by comparing the calculated requirements against stock balances; and to monitor overall production by workstation and line, measuring actual production against plan by shift.

The materials management system would interface, through a transaction file, with Lison Industries, Inc.'s Unit Handling System. The Lison system would provide the plant's automated materials-handling capability. Additionally, for other Apple plants not using the Lison system, facilities would be provided for entering transaction data manually.

### Inspection of material

The Macintosh manufacturing process starts with the inspection of incoming materials. The material is debagged (all pecking material is removed), then allocated to one of several storage media for subsequent delivery to work centers on the production floor.

Overhead cranes on moving tracks carry the larger components to the operations center where they are used. Smaller components are stored in totes; these, in turn, are stored in a multistory tote stacker. As the material is required on the floor, cranes retrieve it, placing the appropriate totes on automated guided vehicles. The vehicles deliver each tote to its proper operations center.

Other material is delivered directly from incoming inspection to its appropriate consuming work centers, via automated guide vehicles, while still on the original pallet delivered by the vendor.

Apple has automated the burn-in operation for the Macintosh. Burn-in racks move along conveyers capable of handling 86 units at a time. There are seven levels of conveyers in each of the four burn-in lines, which give the plant a capacity of more than 2,000 computers per day.

Each Macintosh runs its own diagnostics during the 24-hour burn-in period and stores the test results on the micro-Toshiba disk used by the machine. Post-burn-in inspection is then simply a matter of evaluating the results displayed on each unit's video screen, checking the brightness of the screen display and examining

the unit for physical defects. The total inspection time is 50 seconds.

Computers passing inspection are scanned — serialisation tracking begins — as a unit's covers go on — and two bar-coded labels are printed. These carry the unit's encoded serial number. One label is applied to the shipping container, which is palletized and shrink-wrapped. The other label is applied to the pallet's shipping manifest, which is taped to the finished pallet. The pallets are then delivered — again, via automated guide vehicles — to the shipping area

for delivery to Apple's distribution centers.

One of Apple's stated design goals for the materials management system was that it integrate with the company's existing standard Maczmax functionality.

Thus, the system, as developed, uses file elements from Maczmax's bills of material, general ledger, inventory, shop routing, work order status, manufacturing cost, requirements planning and data base management system modules. The Systems Practice also created 16 new

files, 15 new programs and other report programs specifically for the RPM environment.

The RPM materials tracking system requires that the user, by means of Maczmax's shop routing module, define each line on which repetitive operations are to be performed. Likewise, each component on the bill of material for the item being produced must be identified with the deliver-to-operation sequence number in which it will be used.

Using this data together with pe-

See RPM B7/10

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## SPECIAL REPORT

## BOARD from SR/6

When it arrives, the customer installs the board and returns the defective one to Stratus.

At the time of the purchase, Stratus was new and unproven, so West Lynn management interviewed the company's management team and reviewed their business plan to assure themselves that Stratus would be able to stay in business and provide

replacement parts and service. West Lynn then bought the Stratus/S2 system, which now supports 39 terminals located throughout the company. Before Stratus, O'Neil said, the company was "teetering on the edge of not having enough capacity."

"We don't see a ceiling now," Paul McWhinnie, vice-president of Pemcon, claimed.

Making the transition from one computer system to

another is usually a rocky road, but, McWhinnie said, "West Lynn doesn't have any horror stories to tell."

## Fault tolerance

Since fault tolerance is handled by hardware, the programmer does not have to learn any special techniques to assure fail-safe operation. The Stratus computer supports industry-standard Cobol, McWhinnie said.

Pemcon will soon be mar-

keting the software package it developed for West Lynn, with some modifications, under the name DIS+.

The system designers faced one particular challenge: West Lynn wanted to be able to process all special requests for unscheduled, same-day deliveries. This service was difficult to provide when it had to be done manually. Pemcon designed DIS+ to have all of the sales and inventory transactions

that were generated in the order process available for reconciliation before the driver returned at the end of the day.

O'Neil is now getting the department toward telemarketing, not just order entry. West Lynn Creamery carries about 750 products. The department has 25 terminals for telemarketing representatives and four for supervisors. Each telemarketing representative makes between 150 and 200 calls a day.

The DIS+ system was designed for use by people who have little knowledge about computers and no programming experience, according to McWhinnie.

At the terminal, a representative creates an order by entering an account number or name. The system determines the route and delivery date automatically. A secondary menu offers the operator several options for entering the order. One method allows an average order to be created from a sales history file. For customized orders, the history file is used to display the customer's average order for that day and to identify noteworthy variations in the order.

## Added to load sheet

When the order is completed, the products to be delivered are added to the appropriate truck's load sheet. Delivery tickets, which are used as invoices for customers, are then produced in delivery sequence. The system also offers supporting programs that allow maintenance and inquiry to the customer, product, price and route sequence files, McWhinnie said.

At any time, supervisors can check on the status of a route or of individual customer orders. Symbols appear next to each customer name showing whether the order is in.

Supervisors handle routing. Regular customers are automatically assigned to their regular routes, but sometimes orders have to be moved from one route to another.

Another goal the new system achieved is the elimination of estimated orders, O'Neil said. The aim was to increase the number of stops each truck can make by decreasing the amount of discretionary stock assigned to the truck — stock which, if unused, is returned to the creamery.

One of the most noticeable effects of the system has been at the loading dock. Before the Stratus system went into use, preparation of load sheets created a bottleneck, forcing shippers to wait around for written orders so that they could load a truck. It took at least 15 minutes to prepare a load sheet by hand; the Stratus has cut that to less than one minute.



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# Esprit: strategy for Europe's information age

By Charles F. Windhausen  
Report to CIB

In the shadow of World War II and following the founding of the European coal and steel community, the European energy community and the European economic community (EEC), a new form of community is being created in response to the challenges facing European society in the age of technology.

Of the new technologies, five aspects of information technology have been chosen by the EEC as of greatest importance for future European industrial competitiveness. These are computer-integrated manufacturing, microelectronics, software technology, advanced information processing and office systems. The EEC's urgent need to keep up with its competitors in these areas has persuaded governments and major information technology companies to embark on an unprecedented venture in international cooperation.

In the area of computer-integrated manufacturing, for example, the objective is to establish a technology base for the progressive introduction of information technology to all phases of the manufacturing cycle, leading ultimately to fully integrated production systems. As with all five areas of research, this will be achieved by collaborative research and development by EEC industries, software houses, research institutes and universities. This joint venture is Esprit—the European Strategic Program for Research and Development in Information Technology.

## Strategic program

Esprit is a strategic program in two respects. First, it is aimed at precompetitive research. The EEC information technology industry already spends some \$5 billion a year on research and development. Yet only a negligible fraction of this sum is spent on longer term, precompetitive R&D in Europe. The first five-year phase (1984-89) of the 10-year Esprit program will cost about \$1.3 billion and will be financed on an equal basis by the EEC budget and by industry. The final budget was recently passed by EEC member countries. This figure will raise expenditures in precompetitive R&D to around 6% of the total EEC investment in information technology R&D, well in line with the competition.

Esprit is also strategic in that it is selective, concentrating its resources on key sectors of information technology development. The program focuses on the following five interrelated areas:

The central, enabling technologies, which are:

- Microelectronics.
- Advanced information processing.
- Software technology.
- And two specific application areas:
  - Office systems.
  - Computer-integrated manufacturing.

The microelectronics drive of Esprit is directed strongly at the design, testing and production of very large-scale integration (VLSI) silicon chips, a crucial area of the information technology sector in which both the U.S. and Japan have established significant leads. Esprit will be concen-

trating on the fundamental bipolar and metal oxide semiconductor silicon technologies, as well as the computer-aided design techniques required by VLSI miniaturization.

Advanced information processing is at the forefront of Esprit's precompetitive research role, with its emphasis on the future industrial exploitation of information and knowledge engineering, storage and usage, signal processing and external interfaces. Its overall goal is to establish technological functions that will more closely resemble human thought processes, such as association and inference—artificial intelligence.

Software technology is a vital area of information technology in which Esprit can make an important contribution in both controlling and disseminating software research results, as well as eventually overseeing a comprehensive set of engineering and formal standards and a unified framework of concepts

and descriptive notations. As a first step, emphasis in the Esprit software effort is being placed on common tools, formal methods and transformations and information management.

Office information systems are expected to address the single largest market for information technology. The Esprit objectives will be to concentrate on the man-machine interface in areas such as document creation and distribution, workstations, integrated text-voice-image communications with value-added functions and knowledge storage and retrieval. EEC standardization is also likely to be an essential element in information technology applications where disparate systems are brought together.

Computer-integrated manufacturing will eventually mean the overall systematic computerization of the manufacturing process. Research will be concentrated on integrated systems architecture and general

software development, machine control and the development of sensors and microelectronic sub-systems.

The Esprit pilot phase has proved to be an encouraging drama replete with its own major program phases. Due to the relative novelty of the contract conditions and a short deadline (six weeks), the pilot phase was heavily over-subscribed. The 141 million net costs for this one-year phase (50% provided by the EEC) allowed the final selection of 38 out of 300 proposed projects. Most of these are likely to continue into the Esprit main phase after the year's end.

The pilot program can valid in its own right and allow a quick start on activities in a number of key areas, such as defining standards and review of the state of the art. They also test the mechanisms proposed for the main program.

## Partnerships emphasized

Above all, the pilot projects have given encouraging evidence that partnerships among large and small companies, universities and laboratories have been willingly undertaken across national frontiers in the EEC. Esprit is not the private preserve of big business, nor is it in any way an attempt to create an information technology multinational based in Brussels.

Esprit is addressed, quite simply, to everyone in the EEC who can contribute to the program. In order to be eligible for aid, projects must be put forward by firms or research teams that are already established and are currently carrying out R&D work in EEC countries.

A primary justification of Esprit is the synergistic effect it will have. For this, adequate dissemination of information on all aspects of the research is of fundamental importance. Although Esprit is planned to run for 10 years, the information must be made available at least on an annual basis if it is to have the desired catalytic effect and if it is to shape the program for the coming year.

For the scientists directly involved, the EEC intends to organize workshops on each research topic. Meanwhile, a wider clearinghouse infrastructure is being established to collect systematically and make available appropriate information on projects in progress. This will be done through annual conferences and the Information Exchange System (IES), an advanced information technology network now being set up for Esprit. The IES initially will allow potential participants in Esprit to know what is going on under the program. Once contracts are placed, the IES will be the central network linking the various teams in the different countries. It will also be a means of disseminating the results of their work. With connections to national administrations and data banks, the IES should be an EEC-wide network that is of lasting value to the entire European research community.

The response to Esprit has been positive. Only the question now hangs over the overall EEC budget prevented the program from being fully adopted by all the EEC governments well before the end of 1983, and calls for proposals for partici-

See EEC 5/10

## SPECIAL REPORT

## EEC from SR/9

tion in the main program are scheduled to go out as soon as possible.

Esprit is still only one strategic action in a wider context. While it is designed to encourage the necessary change of approach by the European information technology industry and to speed up the transfer of technology within the EEC, a technology push must be complemented

by a greater market pull if industry is to smother the costs of developing a new generation of information technology products.

The success of Esprit will thus be heavily dependent on EEC progress toward the adoption of European standards and the removal of national barriers to information technology trade.

New information technology will be one of the dominant sources of technological

advance until the end of the century, and information technology will be one of the world's largest manufacturing sectors by 1990. The world information technology market is projected to grow at an annual rate of over 5%.

Europe has been slow to seize the industrial and market-building opportunities offered by information technology. Although the EEC represents over 30% of the

world market, European industry commands scarcely 10% of that market and little more than a third of the European information technology market itself.

European information technology companies are also relatively small compared with world leaders. EEC governments have attempted to compensate for this by either protective measures or subsidization. These may have kept some

companies alive, but no world competitors have emerged.

Liberalization in external trade, on the other hand, has allowed a spate of licensing agreements between European, American and Japanese firms. This may hold short-term benefits, but it cannot provide a long-term answer.

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### RPM from SR/7

parameter information that defines the physical production line characteristics, the materials management system generates a work-in-process stock status file. This file basically is a concatenation of Maxxim's stock status and product structure files. A file maintenance program does the concatenation; the same program also checks for engineering change notice activity and posts effectivity dates to changed components that have been defined previously.

To create the detailed final production schedule, the system uses a version of Maxxim's master schedule file. The system generates records for each operation defined on the routing with planned quantities derived from the master schedule.

#### Phantom operations

Scheduled completion dates are calculated using logic similar to that found in Maxxim's work order system. Phantom operations — those that consume material but do not report completions — are permitted. The user must assign stage-completion part numbers out of each operation that is planned in a reporting operation. The materials handling system permits completions to be entered manually or derived automatically. The system also permits transfers between lines and/or generic rework centers.

A daily posting program is run at the end of each shift. The program calculates materials usage and generates materials requirements based upon actual production and the next shift's planned production. It also identifies potential shortages based on the balances posted in Maxxim's inventory module.

The Systems Fraction is in the process of defining the materials management system's reporting mechanisms. Also under development are graphics retrievals that will display materials usage vs. planned viability, production run rates by line and work center, and work-in-process inventory stock status.







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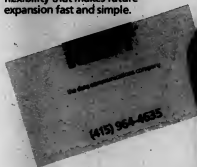
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## SPECIAL REPORT

# Bar code tech monitors Honeywell shop floor

DENVER — Honeywell, Inc. has installed a microcomputer-based system that uses bar code data collection technology to control work flow in the printed-circuit board area of its Test Instruments Division here.

Honeywell manufactures medical diagnostic and test instruments at the plant and produces virtually all of the necessary subassemblies on-site. The circuit card area services all of the different equipment model lines, as well as Honeywell's Field Service Department.

Consequently, there are several hundred different types of circuit boards produced in quantities that

*What was really needed was timely information directly from the shop floor — the source for information about material usage, job status, personnel utilization and work flow efficiency. The problem was that information about these factors was difficult to obtain expeditiously and accurately.*

range from a single unit to several hundred. The circuit card area has production facilities to stuff, solder, test and repair the boards. Additionally, there is an inventory area that maintains a stock of parts specific-

ly for the circuit card area.

The work flow in the circuit card area is arranged in a series of assembly lines with a central work-in-process inventory carousel. Each job is issued under a work order that con-

tains a routing sheet and a parts list. Since there are over 500 different types of assemblies that are built in this area, it is very probable that as many as 26 different types of circuit boards are being worked on simultaneously by the workers on the floor.

The circuit card area had several significant problems:

- Production scheduling was based on information maintained in a plantwide manufacturing resource planning (MRP) system that was updated infrequently. Consequently, the work load of the area fluctuated widely, and due dates were often missed.

- Material was tracked by following paper routing sheets through the production process. These sheets were frequently lost or had erroneous information. Inquiries about the status of specific jobs could be answered accurately only by physically locating the job on the production floor — a time-consuming job for the circuit card area scheduler.

- Personnel time utilization was tracked with time cards that were filled out daily by each employee. This system made accurate cost allocation difficult because direct production time was often logged incorrectly. In addition, information from over 100 employees had to be entered into the MRP system manually — another source for errors.

- Production was often interrupted because of parts shortages. This was due principally to the fact that the production planners would schedule jobs based on inaccurate stock-level information obtained from the MRP system.

#### Study group organized

Honeywell organized a study group consisting of representatives from the Production Scheduling Department, its engineering group and Clear, Inc., a software development firm in Colorado Springs, Colo. The group realized that the MRP system had a great deal of functionality for planning plantwide resource requirements, integrating financial functions with invoices and bills of material and generating managerial reports.

However, what was really needed was timely information directly from the shop floor — the source for information about material usage, job status, personnel utilization and work flow efficiency. The problem was that information about these factors was difficult to obtain expeditiously and accurately.

Honeywell's system, like most MRP systems, is batch-oriented and relies on paper records or keyboard input for information, which makes data acquisition difficult and time consuming. Consequently, the MRP system often had information about the circuit card area, one of the most time-sensitive areas of the manufacturing plant, which was incomplete, inaccurate and out of date.

The production planners worked with engineering staff to define the functionality and information requirements necessary to schedule, monitor and adjust work flow for optimum efficiency and throughput. They worked with the constraint that the proposed solution could not

See MRP SR/22

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# Factories adopting distributed intelligence

Combines collection and processing of data, expedites its use

By Stanley E. Selvin  
and R. F. Williamson Jr.  
Special to COW.

Traditional concepts of factory automation have given way to the evolution of distributed intelligence in factory data collection systems.

A concept of collecting data historically has followed a fairly simple one-way model. Collection devices served only one purpose — to collect data. The information was then sent upstream to the host computer, where it was processed for further use. Then, data processing has been totally separate from data gathering.

This one-way model has evolved into a more complex, yet more efficient, mode of data collection, largely due to the introduction of distributed intelligence. Because of the drop in cost of machine intelligence — the microprocessor chip — it is now feasible to use in all elements of data gathering. Automated machinery and manual operations, in addition to generating data, now can also use the data immediately to expedite a process, balance inventory or correct a production error.

A simple factory data collection system model consists of a group of terminals (keyboard, bar code or time card) that sends data to a host through a concentrator. Neither the terminals nor the concentrator process data; they just pass it along, often after a light flashes or a beep sounds to acknowledge that the data has been received. In this model, all data processing takes place at the host, where reports are generated and become available to the plant manager, foreman or production worker hours or days later.

In the distributed intelligence system, the terminals and the concentrator, or controller, are equipped with microprocessors. While data is still sent upstream to a host, some of the data can be processed instantly at the terminal level. The advantage for the factory is that distributed intelligence greatly increases the use of data at the workbench.

#### Data collection methods

In the factory, there are three major methods by which data is collected: manually, as in filling out a time card; semimanually, as in key entry or bar code reading; and automatically, with machinery. The data varies according to the type of information transmitted, the speed of transmission and accuracy. Without the option to perform partial processing or to send information to the next workstation for immediate use, report generation is delayed until all data is entered, checked, sent upstream and processed at the host.

The value of distributed intelligence enters at this point. By placing intelligence at the terminal and controller levels, the option becomes available to process some data at the terminal workstation. Although the terminal can only do limited processing, it should be enough to meet the needs of the user at his workstation.

With an intelligent terminal at a robot station, the plant foreman has the ability to monitor the robot's output and to transmit to the next workstation information such as, "Five

parts are on the way." The intelligent terminal at the next station, a manual assembly point, can prompt the worker through assembly steps and cue him to enter data before the product is sent to the next workstation.

Perhaps one of the most important plant functions is inventory monitoring. Placing intelligent terminals at robot stations, workstations and inventory cages can help to balance out the imperfections in data collecting and transmitting capabilities between workers and machines. Excesses and shortages in inventories can be more

readily identified. Higher than normal reject levels can be quickly identified, allowing the worker to deal with the problem immediately. Because the terminals are intelligent, they can receive data from the controller and the host, indicating changes in the work process.

Distributed intelligence is having a large effect on factory automation, especially with respect to the interlinking of data collection devices and processes. Traditional manufacturing technologies are changing due to a need for more efficient modes of op-

eration. Intelligent terminals situated at workstations and robot stations provide an information interchange among themselves, the host and the controller, allowing for effective checks and balances on the shop floor. From this standpoint, distributed intelligence has become the key to peak efficiency in the automated factory.

Dalen is marketing manager and Williamson is vice-president of Innovator Electronics, Inc., a Miami-based manufacturer of data communications equipment.

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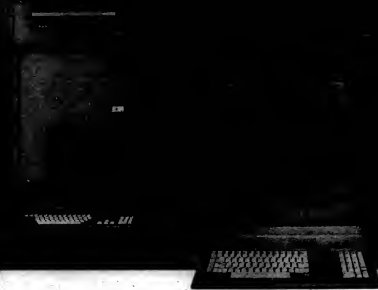
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SPECIAL REPORT



**VISION**

Don SR/11

256 levels of gray. The system calculates nearly 80 million convolutions per second. The controller used is an IBM Personal Computer.

A system from International/Robotation/Intelligence in Carlsbad, Calif., uses a dedicated, highly integrated microprocessor incorporated into a multiple-processor architecture. A systolic-array coprocessor is

used to build up the speed of the host from one million instructions per second (Mips) to 40 Mips.

After the camera samples the scene, digitizing is performed by the preprocessor, which also computes histograms and performs contrast analysis. The host processor and coprocessor examine gradients and detect edges, sharpen edges through a Laplacian convolution, analyze moments, perform compar-

isons with the data base and report on matches. The important feature here is the special coprocessor.

Object Recognition Systems (ORS) in Princeton, N.J., has an I-Sot 1, consisting of an ORS vision system utilizing special algorithms designed to deal with randomly oriented, overlapping parts. This vision system works in conjunction with a robot in performing bin picking.

The main problem with vision systems is still the high price/performance ratio. Typical system prices range from \$35,000 to well over \$100,000.

Even though prices have been dropping or performance has been mounting for a given price, the systems are still too high-priced for many routine automation processes.

Control Automation in Princeton, N.J., has just announced a high-performance, low-cost system that is programmable in Forth, a language that is becoming popular in factory automation. The unit costs \$4 shades of gray and handles 18 cameras, expandable to 64. Resolution is 380 by 480 pixels.

**Speeding automation**

Systems such as these are playing a significant part in speeding up factory automation. Among the processes receiving increased attention are welding, painting, bin picking and assembly. Assembly constitutes a major part of production.

Vision systems help in the fitting process in automated assembly by enabling parts and components to be identified, acquired and presented in a predetermined manner. They also help eliminate costly gaps in robot assembly by providing proper feedback to control the position of assembly tools in an adaptive manner.

Thirdly, vision systems can continuously control the path of a tool along a designated trajectory. A closely related function is in-process inspection.

Tool control for positioning or orientation is also important in fastening. Typical fastening processes are spot welding, arc welding, screwing, riveting, bolting, nailing and stapling. Vision is playing a rapidly growing role in welding.

Bin picking is another area where increasing emphasis is being placed on the use of vision systems. In this process of acquiring work pieces one at a time from containers and relocating them at predetermined places with predetermined orientations, a good deal of sophistication is called for in the vision system.

Today's vision systems are far superior to those of a couple of years ago as far as robotic applications are concerned. Even though gray-scale capabilities are much better, even better capabilities are needed, as robots are called upon to see all images regardless of background lighting or overlapping. More and more powerful algorithms are being generated in order to get the greatest benefit from modern computer hardware.

Lakshminarayanan is a project director for Frost & Sullivan, Inc. in New York.



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## SPECIAL REPORT

# Middle managers feeling automation ax

By Theodore T. Zepfel  
Special to CWA

The implementation of today's more sophisticated factory automation systems often results in job displacement among the middle managers required to implement them. These middle managers are faced with a difficult choice. If they strive to implement the new system successfully, they may end up losing their present job and facing an unknown future. Resisting or even sabotaging the implementation carries its own risk. The implementation may be delayed, but it is rarely canceled. The recalcitrant manager is often the first to go.

Job displacement among middle managers due to factory automation is a relatively new phenomenon. In the U.S., job displacement discussions have revolved around the blue-collar worker and how to manage the resultant problems without strikes or other disruptions. The middle manager was not directly affected because of the low level of factory automation.

The first stages of factory automation involved the introduction of automated or numerically controlled machines such as lathes, milling machines or automated insertion machines. These machines increased productivity by increasing simultaneously the number of items produced per worker per shift and increasing the quality by decreasing operator involvement and resultant error.

Materials handling systems, automatic warehouse systems and systems to monitor materials flow or work in process sometimes resulted in job displacement among blue-collar workers. If anything, these systems increased employment among middle managers, who were responsible for planning and then monitoring the reports produced by these systems. Manufacturing resource planning (MRP) systems and the general factory data processing systems improved productivity and reduced costs, but had little direct impact on employment among blue-collar workers. Again, they created white-collar jobs.

The advent of management information systems with variance reporting, simplified interactive I/O, spreadsheets, sophisticated graphics and the increasing familiarity of managers with personal computers has begun a radical change. The upper level manager or executive can now directly access the data base and obtain information about the lowest level of the factory hierarchy without going through the intermediate management levels.

Advanced management information systems are used to tie together all of the various automated or computerized systems in the factory, from MRP and the DP center down to individual automated machines.

#### Direct access to all levels

Using such an advanced management information system, the director of manufacturing gains direct access to all levels of the factory. Previously, the information was available, if at all, only after being passed through several layers of middle management. With advanced MIS,

this information becomes available faster and often more accurately, directly from the factory floor.

The successful implementation of advanced MIS as part of an overall factory automation project resulting in computer-integrated manufacturing can lead to the displacement of

middle managers compete with each other for the few remaining jobs. Sometimes this competition is encouraged to an extreme. Here the problem is that the implementation period usually lasts several years. Few organizations can survive several years of intense backstabbing

***Without the cooperation of the middle managers, the implementation of a successful factory automation project and, ultimately, of computer-integrated manufacturing is difficult if not impossible. The question is how to secure their cooperation when it may hasten the loss of their own jobs.***

many middle managers. Factory automation of the computer-integrated manufacturing variety results in an organization consisting of blue-collar workers and high-level managers, but few middle managers.

When building a new automated factory, this is not a problem. No jobs are eliminated. Only sufficient managers and other employees are hired to operate the factory. The problems arise when trying to automate an existing, functioning factory. Then all the normal problems of change are faced in addition to the problems arising from potential job displacement.

The job displacement problems are exacerbated when middle-management jobs are involved. When blue-collar jobs are eliminated, the displaced worker is rarely involved with the implementation of the new automated equipment and thus is unable to impact its success directly. However, when middle-management jobs are eliminated, these same managers are often intimately involved with the implementation and ultimate success or failure of the project that will culminate in their job loss.

The reason for this is that the middle managers have the information that must be incorporated into the system. The ways in which reports are furnished, data obtained and productivity measured under the prior operation must be carried over to the new system in order to ensure a smooth transition. This does not imply that changes cannot or should not be made. But the new system must be integrated with the existing, functioning system over a period of several years. Otherwise, productivity may drop precipitously, and the entire operation may be disrupted.

Without the cooperation of the middle managers, the implementation of a successful factory automation project and, ultimately, of computer-integrated manufacturing is difficult if not impossible. The question is how to secure their cooperation when it may hasten the loss of their own jobs.

A technique that is doomed to failure, but often tried, is to attempt to hide the outcome from the participant — in other words, pretend that nothing will happen; no jobs will be eliminated. However, someone intelligent and experienced enough to be a manager will surely see through the deception and will resist the project, if not act to sabotage it outright.

Another technique is to let the

competition unseated. Usually the results are the opposite of those desired.

A better technique is to plan for the changes and to develop solutions for the resulting displacements. Retraining is one part of the solution. Communication is the other.

Implementation of factory automation gives many opportunities for retraining in computer-related jobs. Most importantly, by retraining, the company retains the practical knowledge and job skills of its employees. Who knows the day-to-day operation and problems of the factory better than the people who have worked

there for years and perhaps came up through the ranks?

Knowing the future job opportunities and being able to train for them can go a long way toward encouraging middle managers to cooperate enthusiastically in the implementation of advanced factory automation projects that may result in the elimination of their present jobs.

This same approach should be used with blue-collar workers being displaced by factory automation. While they may be less able to hinder a factory automation project directly, companies can ill afford to lose the talent and expertise that reside in many of their skilled blue-collar employees.

It is certain that over the next 10 years the implementation of advanced factory automation systems and the emergence of computer-integrated manufacturing or the factory of the future will result in rapid change at all levels, from the blue-collar worker to the executive suite. Only through planning and retraining will smooth transitions be possible. The detailed knowledge of the manufacturing process and its problems cannot be lost by a company if it hopes for long-term success as opposed to short-term savings.

Zepfel is a senior partner at The Research Collaborative, a Boston-based management consulting firm specializing in high technology.

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## SPECIAL REPORT

**MRP** from SR/14

add significant software overhead or degrade the response time of the MRP system, yet the information had to be available for use by the system. The solution was to design a stand-alone system that could communicate with the existing MRP system, which runs on a Honeywell DP8 S Model 44 with 4M bytes of main memory. The data base takes up 300M bytes of disk storage. The system supports 75 to 85 on-line terminals running 12 hours a day.

The Production and Manufacturing Information System (Promis) was designed by Ciber and provides shop floor control, work-in-process and stock inventory maintenance and timekeeping functions in a stand-alone system that has the capability

for information exchange with Honeywell's MRP system.

The primary objective of complete work flow control would be attained by collecting information from the circuit card area employees about their time utilization using the information from assembly routing sheets. Other information from the sheets would be used to define and control assembly sequencing and to monitor the location and status of all parts and assemblies.

The capture of all this information

and the availability of it in real-time and on-line would provide several benefits:

- Accurate cost allocation procedures for direct and indirect employee time.
- Reduced amount of scrap from improper assembly routing sequences.
- Comprehensive inquiry facilities to locate parts, jobs and production trouble spots.

**Bar code data collection technology was chosen for data input because it provides rapid, accurate information collection from numerous sources very cost-effectively.**

- Accurate assessment of work-in-process levels and overall work loads.
- The capability to assess accu-

rately standard production times, employee efficiency and current backlog for accurate production scheduling and completion time estimation.

This design was based on the premise that the information could be input by the employees who generated it. This would eliminate redundant data input and its accompanying inefficiencies. It also implied that the data collection methodology had to be easy to use and could not interrupt the work flow.

Bar code data collection technology was chosen for data input because it provides rapid, accurate information collection from numerous sources very cost-effectively.

It is easy to use and can quickly become a part of the employee's work cycle. Since it eliminates the need to fill out time cards, it actually speeds up the production process rather than inhibiting it with excessive monitoring.

Bar code wand stations were located throughout the production and inventory areas to collect information from bar code labels on employee badges, work orders, material totes and name pads.

The employees were instructed to record the receipt of a job at a workstation, the completion of work at their stations and the movement of work from their stations. This information is input with the bar code wand and labels.

**Maintains routings**

Promis maintains a routing for each assembly released to the shop floor. The system uses this routing as a guide while it monitors material movement throughout the assembly process and will not permit an employee to move a job to a work center that is out of sequence in the routing.

Timekeeping functions are processed automatically by Promis, which maintains a complete record of direct and indirect time accumulated by each employee. This information is also accumulated for each job for cost allocation and scheduling information.

The work-in-process dispatcher is able to inquire about the location, priority and status of a job that might have segments in several locations within the work-in-process carousel as well as on the production floor. Using this information in conjunction with work center load data, the dispatcher is able to balance work flow on the assembly lines.

The schedulers are now able to answer inquiries from other departments using on-line information available immediately on a CRT terminal. They have a complete record of all engineering change orders applied to assemblies and can inquire about reject and rework information as it pertains to an assembly or to employees.

The system achieved its design goals because a thorough analysis of the work flow and information components available from the shop floor was performed.

This was correlated with the scheduling department's requirements for accurate planning and monitoring functions. The implementation of the system as a stand-alone gives it excellent response time and flexibility while maintaining the capability to provide the MRP system with accurate, timely information with a minimum of software and response time overhead.

## MRP VERSUS OPT: SOFTWARE vs. THOUGHTWARE



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SPECIAL REPORT

# Criteria for pushing automation to its fullest

By Robert L. Howie Jr.  
Special to CWA

Five criteria must be met for computerized automation of information management, engineering and production to achieve its full potential:

- Management commitment to automation at the highest levels.

- A complete understanding of application requirements.
- Optimum materials management.
- Subsystem investment with integration in mind.
- A concomitant belief that manufacturers will build solutions by managing

technology, not just automating. That leads to a sixth ingredient: The corporate business plan must be linked to manufacturing operations, and that business plan must drive the building of manufacturing competence. The next generation of

manufacturing technology will be devoted to integrating manufacturing functions with management information systems. This will require innovative manufacturing data base management to provide easy storage, retrieval and manipulation of large quantities of data; full

data communications to distribute design, engineering and production data over a network of computers; operating systems and applications software as a foundation for a fully integrated system; and integration engineering services for systems capability planning.

Communications is undoubtedly the key to integration and to building the future factory. The major components of the manufacturing environment — computer-aided design and engineering, machine tools, materials handling systems — must be tied together.

On the shop floor, such a communications system enables a quick response to sudden changes in process conditions — for example, overfeed or device breakdown. Essentially, this kind of industrial local-area network provides real-time process control.

The industrial local-area network is an intrafactory communications system that ties together and supports transparent information transfer between users and intelligent shop floor automation. The key word is transparent; the local-area network represents a pipeline with added value and provides a standard architecture for machine-to-machine and man-to-machine interface.

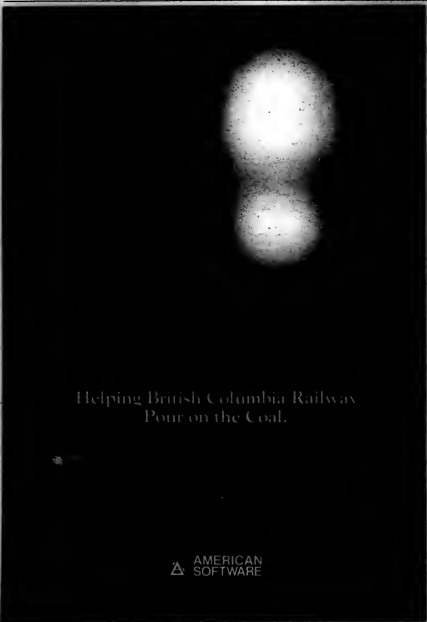
## Part of total

Local-area networks do not stand alone; they should be seen as part of a total systems approach, supporting the sale of peripheral devices such as programmable controllers, robots and other shop floor automation that will hang on the networks.

Industrial local-area networks require specifications much stricter than those targeted for the office. Factories are often noisy and corrosive, and electromagnetic interference degrades communications capabilities and durability. Factory communications are much more performance-conscious — and less cost-sensitive — than those of the office, and users can expect to pay a premium for reliability, data integrity and guaranteed access time.

The issue of standards remains paramount. Each of the competing companies in this market has developed its own proprietary communications system. Acceptance of any one standard is a long way off. Standards in factory communications will take shape differently from standards in the office.

*Howie is director of marketing of the Factory Systems Planning Service for The Yankee Group, a Boston consulting firm.*



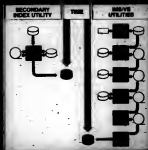
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# GM controllers solve materials handling

## By directing disc brake assembly parts over mile-long conveyor

**SAGINAW, Mich.** — A programmable controller serves as the primary intelligence device to operate and control a complex conveyor line that runs over one mile at a General Motors Corp. automotive manufacturing plant here.

Programmable controllers have solved a complicated materials handling problem on the Old Manufacturing Division plant's high-volume conveyor and transfer system, which is used for machining steering knuckles here. The knuckles are part of a disc brake assembly used on front-wheel and rear-wheel drive cars.

Where a pair of redundant Digital Equipment Corp. PDP-15 computers formerly were employed, a Gould, Inc. Modicon 584 programmable controller now makes the necessary decisions and executes the divert algorithms to control the conveyor system, relieving a redundant pair of DEC PDP-11/70s for more urgent tasks. The programmable controller is interfaced to the PDP-11/70s using twisted wire pairs.

Steering knuckles are transported on pallets attached to a chain conveyor that is installed at the plant's ceiling level, more than a mile long. The conveyor is similar to a railroad, with spur lines or side tracks leading to the various machining operations located throughout the 200,000 sq-ft area of the building. This main chain conveyor is primarily used to transport parts from machine to machine. However, it also provides an inventory of parts between operations and can store more than 30,000 steering knuckles.

Spur lines receive pallets of knuckles destined for one of three different machining operations. These spur lines also provide a parts bank ahead of each machine to ensure a steady flow of parts to each of the machining operations. When the

spur line is saturated with pallets, the control system diverts additional pallets back to the main conveyor or to an additional storage loop that can retain the pallets until they are required for one of the machining lines.

As a carrier travels along the main conveyor chain, each time it approaches a spur conveyor, the control system executes a divert algorithm. This decision, rendered by the programmable controller, determines the path of the carrier — whether it stays on the main chain conveyor or whether it is to be diverted into a spur line for a machining operation.

### System design criteria

Some of the design criteria that make up the control system include:

- Parts type separation.
- System balance.
- Storage loop allocation.
- Lot control.
- Man/machine interface.

Parts type separation refers to the fact that the system produces three different sizes of knuckles that are used on a variety of disc brakes for compact, mid-size and full-size cars. Plant mix for the various knuckle sizes can change daily, since all sizes are not necessarily run each day. As a carrier approaches a spur, the control system must consider its sequence in the machining process and the type of parts the carrier contains.

Another critical factor for the system is line balance, or consideration for the machining operations that operate at a variety of speeds. The number of parts per hour that each machine can produce varies from 400 to 600; line imbalance is caused by variations in production rates and by machine utilization that is usually less than 100%, a combination that can force the system into a continuous state of imbalance. Smooth operation can be achieved through a complex

algorithm that allocates units to the storage system with minimum efficiency.

A storage loop in the conveyor system is used to achieve line balance and serve as a surge tank for the main conveyor. The control system determines the optimum number of carriers on the line and switches all excess carriers onto the storage loop. If the carriers completely load the line and the storage loop is also filled, the control system shuts down that particular machine operation until there is space available on the line.

Lot control is a factor that determines the relative age of all the parts on the line and attempts to use the oldest parts first. A decision has to be made as each carrier approaches a spur line. The controller must look ahead and determine if the machine is running and if there is any storage space left on the spur line, which normally holds four or five carriers. It also must determine if any of the other spur lines have more urgent needs; if so, the carrier will pass by and be directed to a more needy machine.

The man-machine interface is required to start, stop or change the status of the control system. It gives the operator the ability to cope with the day-to-day problems of overriding the control system with human input. Items under human control include carrier data interrogate or update. This capability allows an operator to assign any carrier to a special destination for rework or to achieve system balance. It is also possible to direct a carrier to a repair station, if necessary.

Control of the conveyor line is achieved with a hierarchical control pyramid. At the base of the pyramid is 12 Gould Modicon 484 programmable controllers that are referred to as automation controllers. They operate each of the spur lines and take

control of the carriers once they are diverted onto a spur. The programmable controller unloads the parts from the carrier, delivers them to the machine tool and reloads the machine parts into the carrier. Loaded carriers are then routed back on the spur line and merged into the main conveyor.

A second level on the pyramid controls traffic on the main conveyor line. For this part of the system, there are three remote I/O devices from the 164 programmable controller that are referred to as recirculation panels. These panels direct the carriers through the spur entrance on the main line and prevent collisions at the spur exits and around corners on the main conveyor. Each panel is responsible for a portion of the overall conveyor system.

A third, or intermediate, level of the control pyramid has a Gould Modicon 584 programmable controller that controls the main conveyor. This controller is the primary intelligence device for the control system. A second Modicon 584 is installed to serve as a backup unit to the primary programmable controller. The system allows manual switch-over to the backup controller if it is required. At the top of the control pyramid are the pair of redundant DEC PDP-11/70 computers. The computers are used for monitoring machine operation or for controller status report generation or backup data monitoring to track the current status of the conveyor line in case of a failure at the intermediate control level.

In larger control systems, the primary function of the computer was to execute the divert decision at the spur line. With programmable controllers making these decisions, the computer is relieved of this real-time decision making, thus allowing it to be assigned additional tasks.

## Network links conveyor system components

**SAGINAW, Mich.** — Since the conveyor system at General Motors Corp.'s Saginaw Manufacturing Division plant uses many hierarchical levels and types of intelligence, there must be a form of communications network between all of the components in the system.

The 12 automation controllers and the three I/O devices use the simplest form of communications, with a network of hard-wired interlocks. Other networks in the system include a Gould, Inc. Modbus network for remote programming of all registers, input and outputs. Except for the logic, the total status of the programmable controllers can be determined with the remote monitor, thereby eliminating the need for programming the logic. The monitor also makes the information gathered by the controllers accessible to the operator or to maintenance personnel.

Another maintenance tool developed with the control system is a remote register access panel that is mounted on the recirculation panel

networks to achieve complete control of the conveyor system.

Each level of the control system is designed with a number of maintenance tools. The automation panels have graphics displays that illustrate the loading and unloading of the carriers. The status of all limit switches, solenoids and various internal logic conditions is shown on the graphics panels, which also can be used by maintenance personnel to aid troubleshooting.

A Modicon P464 remote monitor allows interrogation of all registers, input and outputs. Except for the logic, the total status of the programmable controllers can be determined with the remote monitor, thereby eliminating the need for programming the logic. The monitor also makes the information gathered by the controllers accessible to the operator or to maintenance personnel.

Another maintenance tool developed with the control system is a remote register access panel that is mounted on the recirculation panel

door.

The remote register access panel is used for interrogation of the programmable controller status and also as a fault display system. The panel consists of a four-digit display, an array of 16 lights and a chart that identifies the I/Os and other connections of the system and a single fault light.

A multiplexer is used to obtain information from the carriers. Readers at each divert point use a multiplexing scheme to a single input.

The control system uses a structured data base. The basis of the entire logic program is a structured flowchart. This was constructed first, and it consumed several months of design effort. With the structuring of the data base, the structuring of the systems logic occurred naturally. For this structuring, the main conveyor controller was regarded as a computer, with computer concepts applied to the logic of the programmable controllers.

When a new tape is loaded into the main conveyor controller, it activates

the initialization task. When this task is involved, all motion of the carrier is stopped and the controller data base is wiped clean. The computer can then update the current status or proper data base to the programmable controller.

To aid in solving the complex divert algorithm, a linked list is used. This is a method of organizing blocks of information in memory. Each block has a trunk that points to the next block of information and a tail that points to the previous block. By sorting the information in memory prior to the actual decision making, the time required to solve the algorithm is reduced.

A polling system is used to reduce the cost of the system by associating with programmable controllers. Each time the programmable controller changes its data base, a flag is sent to the computer. The computer constantly monitors these flags and when it detects a change of state, it only reads that portion of memory that has changed.

# Programmable controllers altering shop floor

By John G. Rowe  
Special to ENR

The success of factory automation technologies begins and ends with their impact on the functions of the factory floor. All of the various types of computerized manufacturing systems — material requirements planning, computer-aided design and manufacturing, robotics programming systems, numerical control programming systems, inventory control and shop floor scheduling — have as their central purpose the support of production on the floor.

A microcomputer-based revolution is occurring in control techniques down on the floor itself, a revolution that currently tends to be overshadowed by these more glamorous applications. This trend toward microcomputer control will have an impact as large as, if not larger than, the introduction of the microcomputer into the office and home. This factory micro is the programmable controller.

Programmable controllers employ stored programs in memory, recognize inputs and outputs by fixed address locations assigned to each, make logical decisions and generate commands. They also communicate quite easily by direct wiring with the devices that they monitor and control. That control consists of interpretation of simple binary events such as on/off, empty/full or hot/cold signals and data events such as time, position or product levels. In other applications, more complex sequencing, analog data interpretation and sophisticated data handling are used.

## Two-part composition

The programmable controller is composed of two parts: a CPU and an interface. The CPU consists of a power supply, memory and the processor. The processor makes control decisions based upon the application program stored in memory. The interface isolates the CPU from industrial noise and provides signal conditioning to control external devices. I/O or servo control modules form this interface between the processor and the controlled operation. The input control or sensor devices on the machinery are wired to the input modules, which convert the signals to the proper voltage to provide machine or process status information to the processor, which in turn decides the appropriate status for the output devices. These signals are converted to the proper voltage and sent to the output devices by the output modules.

More recently, programmable controllers have included such advances as mathematical calculation capabilities, data transfer and comparison and the ability for peer-to-peer communications between common machines via data highways. These data highways are tailored communications networks with the logic to determine which programmable controller is transmitting and which is receiving as well as acknowledgments of receipt. Gateways are then employed for linking groups of programmable controllers from different vendors together or to factorywide networks.

Programming these controllers usually involves the use of ladder

logic diagrams — the methodology already used by factory technicians for wiring relays. Thus, ladder logic can be thought of as a high-level, user-oriented language, in that no special computer knowledge is required in the operation or maintenance of programmable controllers. Further, some manufacturers have augmented ladder logic with mnemonic commands or introduced basic and Boolean logic as alternatives in order to make better use of the logic power of the microcomputer.

Future developments in programmable controller technology will include:

■ A standard industrial ladder language.

■ Standard communications interfaces and protocols.

■ Color graphics in displays for machine programming and monitoring.

■ Increasing capability with decreasing cost, as microcomputer-based programmable controllers take advantage of advances in semiconductor technology.

The ability of programmable controllers to handle complex operations and optimize the control of the machine to produce a part most effectively will result in a hearing of the

boundary between the logic contained in the numerical control parts program and that contained in the ladder logic at the controller level. Thus, the areas reserved for microcomputer-based programmable controller applications and microcomputer- or mainframe computer-based applications for factory control will become, in time, as indistinct as those reserved for microcomputers and minicomputers in traditional commercial data processing applications.

Rowe is a principal of J.C. Rowe & Associates in Cleveland, a consulting firm specializing in industrial automation.



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## SPECIAL REPORT

# Successful MRP needs full-time project leader

By Gumbus S. Morello  
Special to CWS

Manufacturing resource planning (MRP) implementation is a long and arduous trek through a maze of well-intentioned advice, essential building blocks treated as givens and a myriad of buzzwords.

Three givens for successful project management are:

■ The position of project leader requires full-time attention.

■ The individual selected as project leader need not, and should not be, a systems person.

■ Using an outsider as

project leader does not enhance your chance for success.

The role of the MRP project leader is to organize and direct the project team, to supervise the implementation of the manufacturing control system, to assist in the development of operational proce-

dures and to coordinate educational schedules and programs. Anyone who has performed any of these tasks can infer that, together, they require the full-time dedication of an individual.

The key words used to describe the role of an MRP project leader are: organize, im-

plement, develop and schedule. Anyone involved with data processing, from order to MIS director, will recognize these as essential requirements for proper job performance. To assume that a production expert from an informal or expedient-based manufacturing environment will be better suited for supporting a formal, schedule-guided environment is dangerously incorrect. A good DP manager — who must live within the constraints of a scheduled environment, has to react daily to provide needed flexibility, organize on demand and constantly evaluate efficient operating procedures — is a prime candidate for consideration as a project leader.

If the DP area is unable to supply a project leader, should you settle for second choice? MRP concepts are not revolutionary by any means, but to take a hardened expedite-trained production person and expect him to embrace MRP may be a formidable task in itself. On the other hand, what you produce and how you produce it is no great mystery, and production does not differ drastically from other similar industries. An outsider, experienced and versed in MRP procedures, is more easily connected to a company's special manufacturing requirements than an expedite-trained production person is to MRP concepts.

The traditional practice has been to separate the position of MRP implementation project leader from the DP department. A great deal has been made of the fact that MRP implementation is a people project, not a computer project. The process of implementation is the same as installing an accounts payable or inventory system. User interface and input, description of the current procedures and paper flow, definition of system specifications and requirements and formulation of the standard operating procedure for new systems are all valid steps that a good DP manager follows when implementing any system.

DP personnel are no strangers to the development and implementation of new systems. MRP is just another new system. Your chances for success are enhanced by placing the responsibility for implementation leadership back into the hands of the implementation expert — the good DP manager.

Morello is MRP project manager for Perfect-Line Manufacturing Corp., a manufacturer of electrical products, located in Amityville, N.Y.

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# Integration coming to shop floor automation

By Ray L. Blumenthal  
Special to ENR

There is a revolution catching fire in manufacturing. Automation that started on the shop floor is revitalizing American industry. It has included the various technologies of manufacturing resource planning (MRP), computer-aided design (CAD) and manufacturing, computer-aided engineering and robotics to boost productivity and profits.

But the movement toward high-technology solutions provided by DP personnel has not been restricted to shop floor tools and the managers of production. The revolution has now moved toward the functional integration of all these technologies. Functional integration will forever change the way business is conducted, enlisting everyone from the shop floor to the administrative floor, including the top decision makers.

The movement toward automated systems was inaugurated by DP personnel who were the managers of production. The revolution has now moved toward the functional integration of all these technologies. Functional integration will forever change the way business is conducted, enlisting everyone from the shop floor to the administrative floor, including the top decision makers.

corporate finance, purchasing, engineering and marketing clamored for the same timely and accurate information.

While much of the information revolution taking place on the shop

the world market in the 1970s, manufacturers found themselves caught in a squeeze play. Inflation and high interest rates required that they cut inventory while increasing production efficiency. Changing consumer atti-

needs, while master production scheduling increases the ability to forecast accurately production in the future.

Armed with this information, purchasing can greatly improve its performance and ability to ensure the best price and service from its suppliers. In turn, an integrated purchasing system that can record and track vendor performance serves the information needs of engineering in designing and specifying purchased parts.

Another critical functional link exists between the shop floor and financial management. Information gathered in inventory control and shop floor control is just as important to effective cost accounting as it is to shop management. The actual cost of material and labor activities can be analyzed using the cost of operations and materials defined in manufacturing standards as a benchmark. The various functions add financial management in pinpointing out-of-control cost situations. This ensures that the information used to plan and control production is the same information used for cost accounting.

The axiom that knowledge is power is especially true when determining a competitive price that will return a sound profit. The pressures of the changing world market in the 1970s made the imperative that marketing have the best information available in setting prices. Marketers, in turn, were the first to become aware of shifting customer attitudes regarding buying trends. This information is crucial to forecasting and developing a workable master production schedule.

Information about what the customer likes and dislikes is extremely useful to engineering. Engineering can readily transfer that information into product design and tooling improvements as well as perform change simulations and consolidation with CAD. In an integrated system, CAD feeds that information directly into the bills of materials in manufacturing standards, which brings another information loop full circle.

The functional link between marketing and the manufacturing plant is achieved with a formalized order processing system. Order processing marks the beginning and end point of manufacturing.

With an order processing system that is functionally integrated to an MRP II system, "on hand" and "available to promise" information can be relied upon. In a market increasingly turned to service, this can spell the difference between a one-time buyer and a repeat customer.

The revolution that started on the shop floor has begun to come full circle. Functional integration is the thread that weaves the entire manufacturing process — from engineering to material planning, to production, to marketing, to accounting — into one completely integrated fabric in which each of the different parts serves and supports the whole. It grows another section. The whole is always greater than the sum of its parts.

Diconelli is vice-president of the Manufacturing Systems Division of Management Science America, Inc., a software vendor based in Atlanta.

*While much of the information revolution taking place on the shop floor was of real value to other areas of the company, one very vital ingredient was lacking: There were no links, no bridges, to tie one area of a manufacturing company to another — marketing to order management, to engineering, to purchasing, to production, to finance and back again. What was needed was a functionally integrated solution.*

floor was of real value to other areas of the company, one very vital ingredient was lacking: There were no links, no bridges, to tie one area of a manufacturing company to another — marketing to order management, to engineering, to purchasing, to production, to finance and back again. What was needed was a functionally integrated solution.

Production management is most acutely concerned with planning for and controlling the resources required to produce a marketable finished product.

With all the changes wrought in

tudes demanded quality, choice and service, while there was always pressure to maintain or reduce costs. Efficient, high-volume production rates had to be balanced against shorter runs for market flexibility.

MRP II gave production management the tools it needed both to plan and to control production within these constraints.

On the control side, manufacturing standards must be developed to define what goes into each product. Manufacturing standards also specify standard routings required to support the production process. Inventory control provides a means of tracking inventory from the receiving dock to the warehouse and through production. Shop floor control provides for dispatching and tracking work assignments systematically.

## The planning side

On the planning side, the most important MRP II tools include master production scheduling, which is a formalized plan that tells production what, when and how much it is going to make. MRP and capacity requirements planning translate the master schedule into what materials and capacity are required to execute the plan.

All of these tools are, in themselves, important advances in the way production is managed and controlled. They produce significant cost savings by giving production management a better view of what is happening on the shop floor. They facilitate reductions in inventory levels as well as improved customer service. They give management the ability to anticipate material shortages as well as capacity bottlenecks, and they give marketing accurate information on what is available to promise.

But manufacturers began to appreciate the fact that these tools also supply information of great value to other corporate managers in the areas of finance, marketing, purchasing and engineering. Just as MRP II was the natural evolution of MRP, functional integration is the next step in providing the links and bridges tying the various pieces to a larger whole.

One of the most critical functional links takes place in the cooperative effort of production management and purchasing management to control inventories. MRP provides time-phased information on material

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# SOFTWARE & SERVICES

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William H. Innon

## Subject data bases: blueprint for shop

First of a two-part series

**S**ubject data bases are the integrated, consolidated data bases that result from a rigorous data modeling effort. Subject data bases combine related data elements into a single data base, even when the elements come from vastly differing requirements. When an organization defines its subject data bases, there is no overlap between the data bases and, furthermore, all functions served by the shop are represented in the data bases.

In addition to reducing data redundancy, subject data bases also reduce process redundancy, since the fewer data definitions there are, the fewer programs need to be developed and maintained. A significant by-product of designing and implementing subject data bases is efficient development and greatly reduced maintenance work load.

Subject data bases that are produced as a result of a modeling exercise are, in essence, a blueprint for the data architecture for a shop. There is no question as to the usefulness of a well-constructed blueprint. Unintegrated systems do not lay a foundation on which future systems can build. Data and processes, in whole or in part, must be constantly re-created.

But it is not enough merely to create a blueprint. To be effective, the blueprint must be translated into tangible systems. This translation must be done carefully, because subject data bases lend themselves to some very real implementation problems.

The implementation of subject data bases must be tempered by the environment in which they will operate. Specifically, the on-line operational environment and the decision support environment are of relevance to the implementation of subject bases.

There are two primary considerations

See SUBJECT page 68

## Introducing Olympic Games for computer programmers

By Phil Schwartz  
Special to CW

In this Olympic year, there is, unfortunately, a class of deprived citizens who cannot relate to the Olympics at all. These people are as miser in their own world that they rarely see daylight, let alone get any exercise. These unfortunate are known as programmers.

In an effort to get programmers interested in an exercise program that is compatible with their life-style, the Winter Computer Programmers' Olympics has been created. Best in mind that the events are geared toward a population whose only exercise is hitting a keyboard.

The winter events include:

- The kludge. (Unlike the thrilling, 60-mph sport played by death-defying daredevils, this is a favorite of insecure programmers. The object of the game is to see how dense and unworkable a simple read/write program can be made. Points are scored for meaningless data names, dead code, unused files and so on. Any shred of common sense immediately disqualifies the contestant.)

- The 90-meter ski jump. There is no starting gun for this event. Instead, the player is awakened by a 3 a.m. phone call from the night office and summoned to the operations room to fix an e-mail. The player must reach his destination within 30 minutes (including the obligatory stop at the local 7-11 for an extra-large black coffee and an 18-oz. bag of Frito's corn chips) in order to read the dump which, of course, has not yet been printed. In order to get a medal, the player must figure out the problem, rerun the job, burst and decollate the output by hand, shave in the company washroom and be at his desk ready for a full day's work by 9 a.m.

- Structured figure skating. In order to qualify for this event, the contestant must first complete the grueling, two-hour Cross-Country Walkthrough. Those lucky enough to make it will be rewarded by the beauty and grace of the event. The player is judged by his peers for the design of his

loops (no figure eights allowed here), for readability of his routines and for style and grace.

- Systems bobsladding. This fast-paced, nerve-racking event is played primarily by those programmers currently seeking employment elsewhere. The gold goes to the programmer with the best explanation for why he is wearing a three-piece suit today when his normal attire is jeans and a T-shirt.

- User-friendly hockey. All participating programmers are forced to join this

event, because some of them wants to. Players are divided into two teams: programmers vs. users. Users attempt to stop programmers from employing DP jargon, while programmers try to convince users that the word "face" is actually a number.

All the events listed are winter programmers' sports, meant to be played in an office building in which the heat has been shut off for at least

36 hours. Contestants are forced to wear winter clothing and mittens while competing at their terminals.

But what of the summer programmer—that competitive breed that spends its summer vacations coding indoors? Just for the summer programmer, we present the Summer Computer Programmers' Olympics which include:

- The discuss. A programmer begins this logic game by asking the analyst for which he is working. "Can I discuss with you the detailed programming specs you gave me on this cocktail napkin?" The object of the game is to ask as many pointed questions as possible within the two-minute time limit in order to prove that the analyst does not, in fact, know what he is talking about.

- The hexadecathlon. This event is a must for the jack-of-all-trades type. Sixteen events, numbered 0 thru F, must be completed. The point is to find the programmer who is best at being all things to all people. Contestant activities include writing business specs, because the user

See OLYMPICS page 67

### SYSTEMS

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## American Software unveils system for IBM mainframes

ATLANTA — American Software, Inc. has announced its Accounts Receivable Management System for IBM mainframes. The software monitors a company's receivable assets.

The system is said to handle the requirements of open-item or trade receivables. It was designed to aid multidivisional companies and has no limitation on the size or number of accounts it can handle, according to the vendor.

A credit data base provides customer history data for three six-month periods and includes pay habits, sales volumes, total credits, high credit, cost of late payments, history

of unearned and excess discounts taken and total collections recovered, the vendor said.

The system prints nine types of invoices and notices using one form and interfaces with order-entry files for automatic credit checking, the vendor said.

The system was designed to operate in an OS environment on IBM's 870 and larger computers, the vendor said.

Prices range from \$45,000 to \$95,000, according to the vendor.

American Software is located at 443 E. Paces Ferry Road, Atlanta, Ga. 30306.

## Intech development tool runs on IBM Personal Computer XT

CAMBRIDGE, Mass. — Index Technology Corp. (Intech) has introduced a software development tool that automates much of the analysis, design, organization and documentation procedures of systems analysis.

Excelsior runs on the IBM Personal Computer XT. It is an integrated, menu-driven package that utilizes graphics, a data dictionary and word processing to allow analysts to draw charts and diagrams and produce documentation. With the diagramming facilities, a user can design enterprise models, data flow diagrams, data structure charts, record and file layouts, screen definitions and report

layouts, a spokesman said.

The product incorporates predefined templates and can automatically generate connections between objects. A link to Microsoft, Inc.'s Microsoft Word package allows narrative descriptions of systems design to be generated.

The integrated data dictionary stores objects, connections, text, data elements and records at the time of drawing. The dictionary has all information about the system and its related graphs, the spokesman said. Up to 10 levels of graphs can be linked together in the dictionary for

See INTech page 67

## SOFTWARE &amp; SERVICES



McDonnell Douglas' Unigraphics II multiple island machining

## McDonnell Douglas unveils graphics tool

ST. LOUIS — McDonnell Douglas Automation Co. (McAuto) has announced an advanced interactive graphics software system, which the vendor said was designed exclusively for 33-bit processors.

Unigraphics II is said to be a tool for design and manufacturing engineers, draftsmen and detailers and can be used in product development, including engineering design and analysis, drafting and the generation of numerical-control data.

Unigraphics II has an associative

data base that permits the user to establish and manipulate links among information to help automate design, drafting and manufacturing, a spokeswoman said. Functions automated by Unigraphics II include the dimensioning of drawings and the development of programs to machine-complex product geometries.

The Unigraphics II system is designed to run on 33-bit minicomputers, such as the Digital Equipment Corp. PDP-11 under the REX-11/M operating system, the VAX-11 under VMS and the Data General Corp. Eclipse and Eclipse MV series processors under AOS and AOS/VB.

The spokeswoman said the end

product of a design developed with Unigraphics II is a three-dimensional model of a part, with all descriptive data stored in the data base. The data base is a common source of information for drawings and documentation, engineering analysis and numerical-control instructions for manufacturing and permits integration of computer-aided design and manufacturing and computer-aided engineering tools. Unigraphics II can also be interfaced with McAuto's robotics modeling and programming products.

The Unigraphics II system is priced between \$40,000 and \$46,000, depending on the host system, from McAuto, St. Louis, Mo. 63166.

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## Hitachi joins Fujitsu, IBM, releases 31-bit address mode

By Karen Smedley  
Special to CW

TOKYO — Hitachi, Ltd. recently unveiled a 31-bit addressing mode that can be expanded to a virtual memory of 8G bytes. The system is IBM-compatible and runs on Hitachi's M-280 and M-360 processors under its VOS/BS 1 operating system. Hitachi's entry into the 31-bit addressing arena was preceded by both IBM and Fujitsu, Ltd., which have already introduced 31-bit products.

Why did Hitachi hurry to the marketplace? Hitachi maintains that "the increase in the volume of user application programs and the development of more complex programs have created a need for memory exceeding 16M bytes."

The 31-bit Hitachi system can switch back and forth between 34-bit and 31-bit addressing. In addition, operating systems exceeding 16M bytes can be relocated to the increased memory of 31-bit addressing.

thus creating room for more files and terminals, according to the vendor.

Users considering the third stage of on-line system implementation appear to be interested in the 31-bit technology. Particularly appealing is the increased number of terminals it supports. Others feel the price is too high, with relatively minor merits.

Costs for M-280 and M-360 field-upgrade kits start at about \$8,100, including the upgrade kit. The operating system is VOS 3/BS 1, an enhanced version of VOS 3, with its portions exceeding 16M bytes relocated to virtual memory.

There are two versions of VOS 3/BS VOS 3/BS 1-JSS 3 supports the I/O functionality under a single processor, and another version (VOS 3/BS 1-JSS 4) supports the same under a multiprocessor system.

Hitachi's operating system VOS 3/BS 1 corresponds to IBM's MVS/BS version 2 and Fujitsu's OS/IV/74.MSP. IBM supports assembler and VS Fortran, released in April, and plans to support all of its other mainframe software on 31 bit.

Currently, IBM Japan is said to be developing a 31-bit version of Cobol and PL/I.

Fujitsu's product supports Fortran 77, Cobol in under development, but Fujitsu has no plans to develop an assembler. Hitachi supports only Ofort/77/EA (Optimizing Fortran/77 Extended Addressing).

The Hitachi mainframe's VOS 3, operating system consists of VOS 3/SFO, VOS 3/SFP, VOS 3/SPP and the new 31-bit operating system, VOS 3/BS 1.

However, as the VOS 3 OS series was a subject of IBM's copyright violation lawsuit against Hitachi, Hitachi does not have the full rights to this software.

Therefore, SP2 users must deal directly with IBM, or else Hitachi can rewrite the entire operating system software.

For SP1 users, Hitachi will partially rewrite the program so that it does not infringe on IBM's rights.

Smedley is a staff writer for Computerworld Japan, a sister publication of Computerworld in which this story originally appeared. The article was made available to Computerworld via the CW International News Network.

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## SOFTWARE &amp; SERVICES

SYSTEMS  
SOFTWARETHE BRIDGE, INC.  
Keyplus

The Bridge, Inc. has announced Keyplus, said to be an on-line, high-speed data entry system for IBM's DOS/VSE and MVS operating systems.

A spokesman said Keyplus achieves high-speed response by working directly with IBM's Vsam. All data is said to be automatically checked at input, and mistakes are highlighted so they can be changed during the initial input session. Keyplus reportedly can also work as a front-end system to run existing batch programs on-line.

Keyplus reportedly can be used to paint screen formats interactively, control data entry and verify data. It is said to provide supervisory facilities. It works with Vsam, and its files use IBM's Vsam or Bdam. Keyplus uses standard operating system JCL and libraries. The Keyplus system also reportedly features access security, message broadcasting and backup and recovery facilities.

Keyplus licenses for \$15,500 for DOS/VSE and \$19,500 for MVS.

The Bridge, 199 California Drive, Millbrae, Calif. 94030.

DATA  
TRANSFORMATION, INC.  
Cruise/36 Release 3.0

Data Transformation, Inc. has announced Release 3.0 of its Cruise/36 job scheduler system for the IBM System/36.

Among the announced enhancements to Cruise/36, the vendor said the system will now support the entire 512-byte local data area for passing parameters and will allow a job to store its current local data area upon completion to be used by another job scheduled later. In addition, users can now specify an override execution priority for jobs being scheduled by Cruise/36.

The vendor said extensive holiday support allows the user to tell the system that certain days are holidays and what action the system is to take in the event that a job schedule falls on a holiday. A new frequency has been added for scheduling a job to run every "xx," or user-specified number of days. Also, Cruise/36 maintains a more comprehensive job history, and it allows for a job-group name to identify the job.

Cruise/36 is priced at \$495 until July 1, when the price will increase to \$606.

Data Transformation, P.O. Box 1541, Cape Girardeau, Mo. 65701.

See SYSTEMS page 62

## Integrated application module announced

Integral Systems, Inc. has announced the Advanced Data Security system for users of its human resource software.

According to the vendor, the Advanced Data Security system is an integrated application module for Integral Systems' Payroll and Personnel System. The software

uses Cullinet Software, Inc.'s IDMS data base management system on IBM mainframes.

The vendor said Advanced Data Security is a real-time system that can be tailored. The system was developed using Cullinet's AD6/On-line, with all screens, programs and work records residing in Cullinet's Integrated Data

Dictionary, the spokesman said.

The system is said to offer dynamic checks that can restrict operator access to records of selected units, as well as employee types and data elements, on either a mandatory or a conditional (range) basis.

The Advanced Data Security

system is included as a module in the Payroll and Personnel System, which is priced between \$20,000 and \$100,000, depending on the host environment, and the modules selected, according to the vendor.

Integral Systems is at 165 Lennon Lane, Walnut Creek, Calif. 94596.

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## SOFTWARE &amp; SERVICES

SYSTEMS from page 61**B. I. MOYLE ASSOCIATES, INC.**  
**Blamedit Release 4.0 of Blamopool**

B. I. Moyle Associates, Inc. has announced its Blamedit system in conjunction with the introduction of Release 4.0 of its Blamopool program product.

Release 4.0 of Blamopool, which is designed to pool job listings in IBM's DOS/VSE, power pooling queries to 3270 terminal printers under CICS, includes a variety of enhancements, including the ability to generate messages in French.

Blamedit is a program editor which has also been designed to generate messages in French. Both Release 4.0 of Blamopool and Blamedit are priced for \$4,000 or can be leased annually for \$3,000.

B. I. Moyle Associates, 5788 Lincoln Drive, Minneapolis, Minn. 55406.

**NETWORK CONCEPTS, INC.**  
**Release 6 of Control**

Network Concepts, Inc. has announced Release 6 of its Control source management and library system for the entire series of Tandem Computers, Inc. processors.

According to the vendor, Release 6 of Control features added total network support and a relational database directory. The new release is said to provide a secure method of allowing remote programmers to share common libraries of software.

In addition, Release 6 features a cross-reference capability, enabling Control to determine where any source file is being used. The directory allows any user on the network to search for programs with Tandem's standard query language.

Release 6 of Control is available for a one-time license fee of \$9,600.

Network Concepts, Two Ridgepole Ave., Cedar Knolls, N.J. 07087.

**PAK SOFTWARE, INC.****BIO**

Pak Software, Inc. has announced BIO, a software product that enables the migration of programs written for Digital Equipment Corp.'s RSTS/E operating system to DEC's VMS system running on the VAX-11 series of computers.

BIO allows RSTS/E-based application software written in Basic or Basic Plus 2 to be transported to VAX/VMS without converting the files and without major programming logic conversion, a spokesman said. This is accomplished by providing a series of external, callable routines designed to emulate the RSTS/E disk file I/O environment.

Depending on the CPU environment, price for the product range from \$500 to \$3,000.

Pak Software, P.O. Box 308 Northgate Station, Seattle, Wash. 98133.

**HONEYWELL, INC.**  
**TDC 3000 facilities**

Honeywell, Inc. has introduced two software facilities that enable its TDC 3000 process management system to communicate with IBM's 4300 series of computers. The facilities include a Binary Synchronous Communications channel link and the ability to transfer files to 4300 hosts using

IBM's Systems Network Architecture protocols.

According to the vendor, the facilities make it possible for the real-time process information acquired by TDC 3000 to be transmitted directly to an IBM 4300 for further manipulation and reporting.

The price of TDC 3000 process management systems starts at \$100,000.

Honeywell, 14404 N. Black Canyon Highway, Phoenix, Ariz. 85023.

**QUALITY MICRO SYSTEMS, INC.**  
**Lasergraft 1200 Version 3**

Quality Micro Systems, Inc. has introduced Version 3 of the operating system software for its Lasergraft 1200 electronic printer.

The latest version reportedly of-

fers new features, including improved emulation with the Diablo Systems, Inc. Model 630 daisywheel printer; business graphics commands for automatic bar and pie chart generation; improved compatibility with Teletronics, Inc. 4010/4014 terminal plotting; new type fonts; arc and circle drawing commands; flood-fill command; and automatic page over- lay, according to a vendor spokesman.

Current owners of the Lasergraft 1200 will receive the Version 2 software at no charge, the spokesman said.

New owners of the printer, which costs \$24,000, will receive the software at no additional charge, according to the vendor.

Quality Micro Systems, P.O. Box 81250, Mobile, Ala. 36688.

**MICROTEC RESEARCH, INC.**  
**Release ASM186, DNT186**

Microtec Research, Inc. has announced the Microtec ASM186 cross-assembler system and the DNT186 interactive simulator.

According to the vendor, the Microtec ASM186 cross-assembler system is a Microtec Research implementation of the structured language specified by Intel Corp. for the Intel 8086/8088 and 80186/80188 microprocessors.

ASM186 is used to assemble and link/load programs on a general-purpose host computer, then download those programs for execution on one of the above microprocessors, the vendor said.

DNT186 is an interactive simulator for the Intel 8086/8088 and 80186/

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## SOFTWARE &amp; SERVICES

80186 microprocessors. It executes the object modules of the target microprocessor in the controlled environment of the host development system, permitting the user to debug software.

Operating in an interactive or batch mode, INT186 performs interactive execution of the object modules of the host microprocessors by implementing, in software, the registers and logic control functions of the processors.

This vendor said both INT186 and ASM186 will operate on most general-purpose computer systems, including 16-bit microcomputers. The Micro-ASM186 cross-assembler system costs \$2,800 without librarian and \$2,500 with librarian. The INT186 interactive simulator is priced at \$1,400.

**Microsoft Research, Suite 235, 205 West Olive, P.O. Box 50327, Sunnyvale, Calif. 94088.**

#### NOVELL, INC. Network/EMS

Novell, Inc. has announced the addition of an electronic mail system to its Network operating system software.

A spokesperson said the Network/Electronic Mail System (EMS) assigns a mailbox to every user in a local-area network utilizing the Network operating system to provide its file server capabilities.

Mail can be sent to an individual user in the network, and mailings can be made to designated groups of users or to an intersection of multiple groups, the vendor said.

User input to Network/EMS is said to be received by a command interpreter, which allows flexibility in command entry. An EMS mail security feature allows access by assigned users only, and an express mail feature immediately informs a user of urgent communications.

Novell's Network operating system currently works in conjunction with several local-area networks, including Corvus Systems, Inc.'s Onset; 3Com Corp.'s Etherlink; Gateway Communications, Inc.'s G-Net; and Proteon Associates, Inc.'s Pronet.

The Network/EMS system is priced at \$795, and the Network operating system is priced at \$1,495, according to the vendor.

**Novell, 1170 N. Industrial Park Drive, Orem, Utah 84057.**

## PRODUCTIVITY AIDS

#### INTERNATIONAL LOGIC CORP. F-Scan

International Logic Corp. has announced the availability of its F-Scan Fortran source code analyzer for IBM CMS and MVS users.

A spokesman said F-Scan operates on either Fortran IV or Fortran 77 source programs and produces reports on program structure, parameter correspondence, common usage and file usage. In addition, a precise static analysis is produced on the program interfaces.

F-Scan can be used as a debugging aid in program development, in performing analyses prior to conversion, in planning for program maintenance and for expediting changes to existing programs, a spokesman said. Consistent analysis is produced for all Fortran packages, including packages developed by previous staff or outside sources.

A perpetual license for F-Scan is priced at \$4,900. Other versions of F-Scan are available for Digital Equipment Corp. VAX-11, Data General Corp.'s Eclipse and Prime Computer, Inc. processors.

**International Logic, Suite 206, 22 Battery St., San Francisco, Calif. 94111.**

#### DATA GENERAL CORP. Screen Generator Utility enhancement

Data General Corp. announced that it has enhanced its Screen Generator Utility software to interface with five additional languages: API, C, Fortran 77, Pascal and PL/I.

The Screen Generator Utility is an aid that is said to reduce development and maintenance time for applications requiring screen management. The software operates on DG's Eclipse microcomputer systems with DG's AOS or AOS/VS operating system and on the Desktop Generation System microcomputers with the AOS/VS operating system.

Current users of the vendor's software will receive the upgraded version at no additional cost. The first-year license fee for the Screen Generator Utility under AOS/VS is \$3,000, with subsequent years costing \$1,800. The first-year license fee for systems operating under AOS is \$1,500, with subsequent years priced at \$1,000.

**DG, 4400 Computer Drive, Westboro, Mass. 01581.**

#### COMPUTING CAPABILITIES CORP.

**Insight, Autopilot enhancements**

Computing Capabilities Corp. has announced enhancements of its Insight and Autopilot applications development tools. The enhancement makes both compatible with the Hewlett-Packard Co. Dictionary/3000 data dictionary.

Insight reportedly allows users to implement on-line applications without programming, while Autopilot is said to create the Vpms forms automatically. Vpms is HP's terminal handler.

Insight can be licensed for \$8,500 and Autopilot for \$1,700.

**Computing Capabilities, Suite 222, 465-B Patrick Drive, Menlo Park, Calif. 94043.**

See AMS 64 page 64

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## SOFTWARE &amp; SERVICES

**AIDS** from page 63**STERLING SOFTWARE  
MARKETING**  
**Compuser Release 4.4**

Sterling Software Marketing has introduced Release 4.4 of Compuser, said to be a productivity tool for programmer/analysts, data base administrators, editors and quality assurance staffs.

According to the vendor, features of the new release include expanded reporting and interleaving, with more than 1,000 print variations to custom-tailor report output.

Compuser runs on any IBM 360 or larger mainframe under IBM's DOS, OS or VM operating systems.

Pricing for Compuser is \$8,000 for

the OS version and \$4,000 for the DOS version. The VM/CMS version is available for \$2,000 when purchased in conjunction with a DOS or OS system before May 1.

*Sterling Software Marketing, 1007 Seventh St., Sacramento, Calif. 95814.*

**APPLICATION  
PACKAGES****MCBA, INC.**  
**VAX Cobol packages**

MCBA, Inc. has announced its series of VAX Cobol software packages for use with Digital Equipment Corp.'s VAX-11 series of supermini-computers.

A spokeswoman said the VAX Cobol packages currently available are accounts payable, general ledger and payroll.

MCBA will also release other VAX Cobol packages, including accounts receivable, customer order processing, inventory management and purchase order and receiving. No availability date was announced.

The spokeswoman said the seven modular, interfacing packages have been designed to work together in a variety of combinations. They are also optimized for DEC's VAX/VMS operating system.

Source code licenses for MCBA's VAX Cobol packages range from \$4,000 to \$6,000, according to the vendor.

*MCBA, 2441 Honolulu Ave., Monterey, Calif. 91060.*

**HONEYWELL, INC.****Business, accounting aids for DPF 6**

Honeywell, Inc. has announced the availability of eight modules of interactive general business and accounting applications for use on its DPF 6 family of small business systems.

The applications were licensed to Honeywell from the developer, MCBA, Inc., and have been converted to make them compatible with Honeywell's Gcos 6 operating system. The eight modules may be used separately or in combination to form an integrated package. They are: order processing, accounts receivable, accounts payable, inventory management, bill of materials processor, general ledger, payroll and mailing list.

A Honeywell spokesman said the software is written in Asel Cobol and uses structured coding to simplify modification. Other features include system integration for faster processing, extensive analysis and reporting capabilities, screen menus and prompts and audit trails.

The initial primary license fee for all eight modules is \$15,500. Each individual package is priced at \$3,000.

*Honeywell, 200 Smith St., Wattham, Mass. 02154.*

**UNICAD, INC.****Romulus-E**

Unicad, Inc. has introduced a solids modeler for use in computer-aided design (CAD) applications.

Romulus-E is said to be an enhancement of the Romulus solids modeler from Shape Data Ltd. Romulus-E combines the geometric definition and manipulation capabilities of Romulus with portions of a "universal CAD system" that the vendor is now developing, a vendor spokesman said.

The software is said to include such features as accurate boundary-file modeling of solids with tweaking, full lifting and sweeping, blending of edges and Boolean operations; symbolic command language with design-type terminology; choice of the preferred interaction technique; wire-frame modeling capability; and rendering, viewing and windowing capabilities.

Romulus-E is said to run on a variety of systems, including Apollo Computer, Inc. DN300 and DN600 intelligent workstations, Digital Equipment Corp. VAX-11 series superminis and IBM 4300 series mainframes, the spokesman said. Prices range from \$40,000 for intelligent workstations to more than \$125,000 for mainframes.

*Unicad, 1695 38th St., Boulder, Colo. 80501.*

**MCBA, INC.****HP General Ledger Release 3**

MCBA, Inc. has announced Release 3 of its HP General Ledger package written in Cobol II for users of Hewlett Packard Co.'s Image data base management system on HP 3000 processors.

A spokesman said the enhanced HP General Ledger package has full multicompartment capabilities and an expanded user-defined general ledger account number allowing up to 24 characters in as many as five levels. The system also allows the user to define financial entities interactively.

Other enhancements to the release include streamlined maintenance of financial statement formats, allow-

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## SOFTWARE &amp; SERVICES

ing groups of accounts to be specified by ranges with the option to print summary or detail, the vendor said. Entry of general journal transactions is said to be speeded by allowing many fields to default to standard or previously entered values.

A source code license for Release 2 of the HP General Ledger package is priced between \$3,000 and \$4,000, depending on the HP 3000 model. **MCBA, 2441 Honolulu Ave., Menlo Park, Calif. 91060.**

## BAKER SOFTWARE PRODUCTS CORP.

Custom Printers Management System Custom EDP Printers System

Two software packages, one for the graphics arts industry and the other for manufacturers of data processing labels, have been introduced by Baker Software Products Corp. Both products run on Wang Laboratories' Inc.'s OS/2 microcomputers.

The Custom Printers Management System, for the graphics arts industry, consists of modules for job costing, timesheeting, inventory control and print job estimating.

The Custom EDP Printers System consists of modules on prospective customers, customer data base management and history, inventory management, accounts receivable, job costing and end-of-month management analysis.

A minimum of 30 programs are contained in the label manufacturers package, which is available for \$4,000 to \$10,000, according to the vendor.

The graphics arts industry package is available for \$14,000 to \$24,000.

**Baker Software Products, P.O. Box 55663, Indianapolis, Ind. 46205.**

## SOFTWARE EXTRAORDINAIRE, INC.

Word Processing Analysis System Release 2.0 Job Accounting and Control System Release 1.17

Software Extraordinaire, Inc. has announced new releases of its Word Processing Analysis System and its Job Accounting and Control System, both of which are designed for use with the Wang Laboratories, Inc. V8 series.

Release 2.0 of the Word Processing Analysis System is said to be transparent to the word processing operator.

Release 1.17 of the Job Accounting and Control System is said to feature an audit trail of user activity, to report unauthorized login attempts and to automatically log off users after a specified period of inactivity. It also reportedly has improved menu-building features.

The Word Processing Analysis System has an annual rental fee of \$750 and a purchase price of \$3,700, a Software Extraordinaire spokesman said.

The Job Accounting and Control System is priced at \$1,500 per year for lease and \$5,500 for purchase, according to the vendor.

**Software Extraordinaire, 1807A Queen Anne Ave. N., Seattle, Wash. 98109.**

## COMSHARE, INC.

Additions to Profile/2000

Comshare, Inc. has announced the addition of a report writer and a salary projection module to its Profile/2000 personnel record-keeping and reporting system for Hewlett-Packard Co. HP 3000 series processors.

A spokesman said the report writer is an addition to Profile/2000's current report writer and its existing reporting capabilities. The added report writer is said to give human resource management users additional flexibility in tailoring reports to meet personnel reporting requirements.

The salary projection module is said to be an analytical modeling tool designed for salary planning. It can be used to determine merit budgets or to allocate a salary budget according to pay-increase guidelines.

Profile/2000, including the new report writer and salary projection module, is priced at \$25,500 for a basic license.

**Comshare, 3001 S. State St., Ann Arbor, Mich. 48106.**

## FARGO ELECTRONIC SERVICES, INC.

Fargo Business Software Series

Fargo Electronic Services, Inc. has announced the Fargo Business Software Series for users of Digital Equipment Corp.'s VAX-11 processors under the Unix operating system.

Seven program modules are available: general ledger, accounts pay-

able, accounts receivable, job cost accounting, inventory control, mailing list management and sales lead processing and tracking.

A spokesman said the program modules are menu-driven and interactive. Information from one program automatically updates other modules that share the same data.

The series is written in C and is supplied with source code and documentation. The accounts payable and receivable modules are priced at \$5,000, the inventory control and job cost accounting modules at \$4,000, the general ledger and sales lead processing and tracking modules at \$3,000 and the mailing list management module at \$1,000.

**Fargo Electronic Services, 7180 Shady Oak Road, Eden Prairie, Minn. 55344.**

## REDWOOD SOFTWARE, INC.

Manex

Redwood Software, Inc. has announced the Manufacturing Execution (Manex) system, which the vendor said operates on the entire series of Tandem Computers, Inc. and Sun Microsystems, Inc. processors.

According to the vendor, the Manex system is a decision support tool designed to help production supervisors and workers monitor and control the manufacturing process by identifying problems as they arise.

The Manex system is priced between \$100,000 and \$250,000.

**Redwood Software, 3090 Pruden Circle, Santa Clara, Calif. 95050.**  
See 70018 page 68

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1-CW-0884

## SOFTWARE &amp; SERVICES

## TOOLS

See page 95

## MARBROOMP

## Split 3

Marbroomp has added Split 3, a circuit-simulation software package, to its MC-500 and Workstation 500 computer systems.

Split 3 is a general-purpose circuit-simulation program for monitoring dc, nonlinear transient and linear transient as analysis, according to the vendor. The program is available free of charge.

Marbroomp, One Technology Park, Westford, Mass. 01886.

## DATA BASE MANAGEMENT SERVICES

MICHAELS, ROSS & COLE, LTD.  
MRC Manager 2.0

Michaels, Ross & Cole, Ltd. has announced release 2.0 of MRC-Manager, a relational data base management system (DBMS) for users of the IBM System/38.

According to the vendor, the product allows users to create on-line inquiries, reports and bar graphs of the information available on the IBM System/38.

The MRC-Manager 2.0 DBMS reportedly features help key documentation, menu-driven multilevel security, multiple retrievals, relational file joining, single or multilevel file capacity and unlimited sequencing and total levels.

MRC-Manager licenses for \$1,140 per CPU. Multisite pricing and worldwide licenses are available.

Michaels, Ross & Cole, P.O. Box 4633, Oak Brook, Ill. 60051.

## REMOTE COMPUTING SERVICES

AUTOMATIC DATA PROCESSING, INC.  
Automail revised rates

Automatic Data Processing, Inc. (ADP) has announced a revised rate structure for Automail, the company's electronic mail service. The new structure is based on the number and type of transactions performed rather than the amount of time elapsed during a session.

Under the transaction-based pricing, users will be charged for each mail activity they perform, such as sending or filing a message, adding or listing identifications in the directory, or posting information to public or private bulletin boards. Message senders will be charged according to the size of their message and the number of copies generated. Message recipients will incur no charge for reading incoming, unread messages, the vendor said.

The basic charge to create and send a message to the first addressee is 75 cents per message segment (1,000 characters). The cost to send the message to additional recipients is 30 cents per addressee. There is no charge for connect time when Automail is accessed directly via ADP's Autonet public data network. However, time-oriented surcharges will continue to apply to access made

through third-party network and Wats connections, a spokesman said.

Automatic Data Processing, 175 Jackson Plaza, Ann Arbor, Mich. 48106.

MIDCOM CORP.  
Time-share access

Midcom Corp. has announced that its time-shared system can be accessed using the GTE Teletext Communications Corp. Teletext data communications network.

The Midcom T/S service is based on Digital Equipment Corp. VAX/VMS and PDP-11 computers and features several languages, including Fortran, Basic, Cobol, Pascal, C, PL/I, Basic and macro.

Teletext usage reportedly costs Midcom users \$3/mo to \$6/mo. Midcom's time-sharing service, meanwhile, is sold on the basis of the amount of user storage and either on a continuous, peak level or limited time-access basis.

For 1M byte of storage, the cost is 3 to 5 cents/CPU sec, with a \$2/hour connect charge. For 10M bytes of

storage, the firm offers its lease-a-port rate of \$800 a month, with a minimum one-year lease.

Midcom, Suite 117, 1840 N. Tustin, Orange, Calif. 92665.

## ON-LINE DATA BASES

OCCUPATIONAL HEALTH SERVICES, INC.  
Hazardline enhancements

Occupational Health Services, Inc. has announced that it has enhanced its on-line Hazardline data base.

According to a spokeswoman, the number of substances listed in the interactive Hazardline data base of toxic and chemical substances has been increased to 8,000. The Hazardline data base is currently offered through GTE Teletext Communications Corp.'s Teletext and Compuserve, Inc.'s Compuserve services.

Access to Hazardline through Teletext or Compuserve is priced at \$2 per con-

nect minute. There is no monthly or subscription fee. Occupational Health Services, 515 Madison Ave., New York, N.Y. 10022.

## ITT DIALCOM, INC.

## AP Videotex service

ITT Dialcom, Inc. has added the Associated Press (AP) Videotex service to its on-line news and information features.

AP Videotex provides national and international news, analysis and feature stories accessed via computer.

According to a spokesman, AP Videotex is key-word-searchable. Approximately 250 stories are filed daily on the service.

Story transmissions are made at 1,800 bit/sec over a dedicated circuit via AP's satellite system to ITT Dialcom. The circuit is an 8-level, Asci-coded system designed to the American Newspaper Publishers Association Standard No. 1512.

The cost of accessing AP Videotex is \$27.50/hour during prime business hours (8

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## SOFTWARE &amp; SERVICES

a.m. to 6 p.m., Monday through Friday) and \$12.60/hour at all other times, the vendor said.

177 Diggins, 1100 Spring St., New Orleans, La. 70916.

#### INFORMATION ACCESS CO. BRIALON INFORMATION SERVICES Magazine Asap; Trade & Industry Asap.

Information Access Co. (IAC) and Dialog Information Services have announced two full-text, on-line data bases of major magazines.

Created by IAC, the new data bases are called *Magazine Asap* and *Trade & Industry Asap*. The *Asap* files reportedly will offer controlled vocabulary indexing of periodicals, as well as the full text of articles from more than 40 major general-interest periodicals and more than 80 business and trade publications on-line through Dialog. In addition, the complete text of news releases from PR Newswire will be available in *Trade & Industry Asap*. Coverage will date back to January 1980.

The new services will be available to all Dialog subscribers in May. There is no initial fee or monthly minimum for using the *Asap* data

bases. Dialog charges are only for actual on-line time, plus a flat charge per article. The average hourly connect time charge is \$74.

Dialog, 5400 Shiloh Ave., Palo Alto, Calif. 94304.

IAC, 11 Davis Drive, Belmont, Calif. 94024.

#### DATA MANAGEMENT COMPUTER SYSTEMS, INC. Knowledge/2000

Data Management Computer Systems, Inc. (DMCS) has introduced Knowledge/2000, an on-line information retrieval system for the Hewlett-Packard Co. HP 2000 computer.

According to the vendor, the regularly updated data has cross-references all the HP manuals included in the fundamental operating software

— the HP Communicator — as well as publications from the HP 2000 International Users Group.

A 15-month subscription to Knowledge/2000 is available for \$1,500. Annual renewals are \$750. A demonstration tape costs \$50.

DMCS, Suite G, 500 Wall St., Auburn, Calif. 95603.

#### GOVERNMENT COUNSELLING LTD.

Thursdays

The Technology Acquisition Resources and Update Source (Thurs), a data base with government procurement regulations for data processing equipment, is now available with a computerized option, Thursonline, from Government Counseling Ltd. Thurs contains all government

regulations, standards and laws applying to the procurement of software and hardware for data processing, office automation and telecommunications.

Users of the Thursonline option may search the data base with an unlimited variety of search criteria, according to the company; no hay fees or indexes are needed.

To access Thursonline, which will be available at the end of March, users need any system that can communicate with an IBM host through a 2370-type terminal. The annual fee for Thurs is \$2,500, with an additional fee of \$150/hour and \$5/transaction for the on-line option.

Government Counseling, 6535 Fadden Court, Alexandria, Va. 22310.

See 66666 page 68

#### OLYMPICS from page 50

cannot speak English; writing system apes, because the systems analyst thinks "on-line" is a term meaning his clothes are drying outdoors; punching cards by hand, because the keypunch personnel are on strike; and mounting tapes, because the operator is having his coffee. In short, the hardware includes all the functions expected of a programmer, none of which is listed in his official job description.

The bulkiest yet. This is a true/false game in which the programmer must figure out whether he is being told the truth by those around him. Phrases tested at the programmer include: "We always compensate our staff for overtime." "Don't worry about that program — it's transparent to you." "Could you please stay a little late today — I'll only need you for an hour or so." "We're putting you on a hot development project next month."

The programmer can, of course, respond with his own unorthodox replies: "Of course I tested that module." "You'll have it tomorrow." and "Met Looking for another job? ridiculous."

The 100-parameter dash. Speed is the main thrust of this event. The object of the 100-parameter dash is to see how fast documentation can be written for a 100-program system (which took six months of development) because operations refuse to run it and because the users are screaming for it. Last year's gold medalist took only a mere 47 nano-seconds.

*Outstanding is a New York-based systems analyst.*

#### INTECH from page 50

explosion and sequencing diagrams. The package includes the software on 5¼-in. diskettes, full documentation, keyboard template and the Microsoft Rymate and Word packages. Single-version prices start at \$8,000, later sold from Five Cambridge Center, Cambridge, Mass. 02142.

**So** you'd like to add the flexibility of a popular personal computer to the power of your WANG 2200. But you don't want to spend \$10,000 to do it.

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**Easy to install.** Anyone can install Micro-Bridge 80 in less than 15 minutes. No special tools are needed. No technical expertise. Simply remove the I/O panel

cover of your 2200 and slip Micro-Bridge 80 into an empty slot. No other hardware alterations are necessary.

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The entire Micro-Bridge 80 package sells for \$1,995 and includes: Micro-Bridge 80 circuit board; installation & operating instructions; CHM 2.2 operating system; Multiplan spreadsheet software; 90-day limited warranty on parts & labor.

2.2 software features documentation and software installation instructions available. Ask for details when you call.

**MICRO-BRIDGE**  
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## SOFTWARE &amp; SERVICES

**BASES** from page 67**BUSINESS COMPUTER NETWORK, INC.**  
Point-to-Point Communications

Business Computer Network, Inc. has announced a communications protocol for users of the vendor's data base services.

The Point-to-Point Communications protocol reportedly is a method by which various types of microcomputers, connected directly or through a modem or local-area network, may

communicate interactively, according to a Business Computer Network spokesman.

The protocol is designed for Digital Research, Inc.'s CP/M operating system on Kaypro Computer Corp. Kaypro II, 4 or 10 microcomputers with a Hayes Microcomputer Products, Inc. Smartmodem 300. It also operates on IBM's Personal Computer and Compaq Computer Corp.'s Compaq microcomputer.

The software is provided free of charge to customers of the vendor's data base services.

Business Computer Network, P.O.

Box 36, 1000 Cottage View Drive, Bismarck, Wyo. 59501.

**TRAINING****SCIENCE RESEARCH ASSOCIATES, INC.**  
IBM VS Cobol II facilities

Science Research Associates, Inc., a subsidiary of IBM, has announced an independent study course in IBM VS Cobol II facilities, a course announced concurrently with IBM's introduction of VS Cobol II.

The course allows users to learn the new facilities of the compiler and focuses on such topics as structured programming concepts, implementing the sequence and the case structure and selection and iteration structures.

The course consists of a two-volume text, a videocassette and a reference guide and reportedly requires nine to 11 hours to complete. IBM VS Cobol II facilities can be leased for 90 days at \$315 or for 12 months at \$900.

Science Research Associates, P.O. Box 5290, Chicago, Ill. 60680.

**SUBJECT** from page 59

of the operational environment: performance and availability. These considerations are important when following the blueprint of subject data bases because subject data bases tend to concentrate data tightly and nonredundantly. The centralization of data that results may not be optimal for either on-line performance or availability.

Performance is hindered when more than one on-line activity must access data at the same time. In the case in which two on-line processes want to update the same data at the same time, the conflict must be resolved. The result of the contention for data under integrity control is a system slowdown.

Contention also occurs when multiple large data base scans are done over the same data base. When long-running activities can be spread over

multiple physical data bases or even over multiple machines, performance problems can be minimized.

But when there is a single machine with a single physical data base with much activity directed at the data base, performance most likely will suffer.

One solution is to break up the physical units of data as finely as possible into small data base records, nodes, pages or whatever is the physical unit of storage. This minimizes the amount of data locked, which, in turn, minimizes the probability that data will be unavailable for access because of contention.

The other contention problem—that of doing large data base scans—can be alleviated by implementing a standard work unit in which large activities are broken down into a series of shorter activities.

For example, a data base scan of 10,000 records can be broken into a

series of 200 scans of 50 records, with intermediate reporting at the end of each scan.

**Another solution**

Another solution is to break a data base into multiple physical data bases. For example, a large parts data base containing parts with key values from 0000 to 9999 is broken into four physical data bases, parts based on key value. This split will allow data to be moved to different environments (such as batch or on-line), to different machines and so forth. The ability to break up data bases at the highest physical level enhances the overall performance profile of the data.

The other subject data base problem in the operational environment—availability—is alleviated when subject data bases are physically broken into different data bases. For example, a data base, A, with one mil-

lion records is divided into three data bases—A', A'' and A'''—each of which has about 333,333 records. The fact that the subject data base is implemented across three physical

data bases does not negate the effect of modeling and integrating data. When A goes down and must be recovered, the entire system is lost. But when A' goes down, only one-third of the system is lost.

Since subject data bases tend to centralize many different environments, the separate recoverability of data is very important.

Some data base management systems have facilities for separate recoverability buried within the system software; nevertheless, the physical division of the data still needs to be carefully planned.

Timothy is a director at Coopers & Lybrand in Denver, a noted author on the subject of data base design and a regular contributor to *SigMise*.

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# COMMUNICATIONS

## Value-added mart to prosper: report

NEW YORK — IBM and AT&T only began offering enhanced data communications services in 1983, but by 1986 they will have grabbed a 30% share of this fast-growing market, according to a study released here recently.

The report, titled "The Enhanced Data Network Market," prepared by Frost & Sullivan, Inc., estimates 1983 revenues of value-added network carriers at \$300 million and forecasts 1986 sales of \$1.5 billion. Firing this growth is the explosive increase in small computers requiring interconnection both with each other and with remote data bases.

Despite their orientation to analog voice communications, telephone carriers are estimated to have garnered 80% of a \$4.5 billion data communications market in 1983 and will still have 67% in 1986, by which time the market will have doubled in real terms, according to the report.

However, enhanced-service carriers' share of the market will jump from 8% to 18% over the same period. Satellite carriers, also fast growing in this area, are expected to have attracted less than 4% of

the market by 1986.

The appeal of enhanced data communications networks for users is their ability to link diverse equipment using dissimilar communications protocols. According to Frost & Sullivan, in today's relatively free-wheeling regulatory environment, these networks — "enhanced" through computer control and data manipulation — can be expected to put more emphasis on services that go beyond mere transmission, such as store-and-forward message services and transaction processing support.

All the established players in this young market — which includes GTE Telecommunications Corp. and Tymnet, Inc., who dominate the group, includes Graphnet, Inc., Uninet, Inc., Compuserve, Inc. and others — can expect to be jolted by two events of the past year, the report notes.

AT&T entered the fray with its AIS/Net 1000, combining a packet-switched network from AT&T Communications with applications-oriented services by AT&T Information Systems, Inc.; IBM rolled out the Information Network to allow its own

and IBM-compatible computers and terminal equipment to link up over a network installed, operated and managed by IBM, according to the report.

From the user's point of view, there are three categories of data communications services: private, dedicated lines and networks; the dial-up public telephone network; and the enhanced services provided by packet-switched public data networks, which are the subject of the report.

"Of the three, the first category is chosen by large corporate users with large data processing centers," the report notes. "The second will satisfy most occasional users who want minimum fixed investment and are less demanding and less sophisticated about data communications, being satisfied with a slower setup, lower speeds and a higher error rate."

"Enhanced services appeal across a wide spectrum from the occasional sophisticated user, particularly in interactive applications, to the most demanding user interested in optional special features in processing, storage and conversion."

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■ Packet nodes building blocks/76

■ Bell South to offer Pulse-link/76

■ Novell claims it serves up files faster/73

### INSIDE

Multiplexers/Modems/73

## Vitalink signs marketing pact with Prime

MOUNTAIN VIEW, Calif. — Vitalink Communications Corp. recently announced the signing of a joint marketing agreement with Prime Computer, Inc. that is similar to a recent pact reached with Hewlett-Packard Co.

Under the terms of the agreement, Prime will serve as the initial point of contact for the service, and Vitalink will sell and install the equipment. Both Prime and Vitalink will be responsible for system compatibility.

The Vitalink system connects to the data link interface of Prime's communications software. "This provides Prime's multiple data paths at transmission rates ranging from 4.8K bit/sec to 96K bit/sec," the vendor said. Vitalink equipment, including the satellite dish antenna installed at the customer's site, costs \$140,000 per site (more than one is needed). The service charge is \$1,800/mo.

Vitalink is located at 1350 Charleston Road, Mountain View, Calif. 94043.

## Ungermann-Bass inks agreements with two firms

LAS VEGAS — Local-area network manufacturer Ungermann-Bass, Inc. said at Interface '84 that it has signed separate development agreements with Davong Systems, Inc. and Protocol Computers, Inc.

Ungermann-Bass said the deal with Davong will enable it to expand the Net/One Personal Connection — an intelligent board-level network interface unit for IBM's Personal Computer — to use Davong's hard disks and streaming tape drives. This will allow networked micros to access 160M bytes of on-line storage.

The agreement with Protocol Computers, Ungermann-Bass said, will result in a series of offerings enabling access to multiple operating systems environments.

The initial products offered are said to provide conversion for asynchronous Ascl-to-SNA 3270, Ascl-to-BSC 3270 and Ascl-to-IBM systems 34/36/38 as well as 3270 deconvolution to asynchronous Ascl. Ungermann-Bass is at 2560 Mission College Blvd., Santa Clara, Calif. 95050.

## Genesys Group to install network in Oklahoma City

OTTAWA — Genesys Group, Inc. has announced a videotex public access information system geared primarily to providing tourists and residents of Oklahoma City with information about special events, activities and attractions in the state's capital city.

Users will be able to access information through public terminals in 40 locations throughout the city, including the Will Rogers Airport and a number of major hotels, starting May 1, a spokesman said.

The system uses a Digital Equipment Corp. PDP-1144 mainframe computer with two 120M-byte disks and is outfitted with Genesys videotex software, which utilizes the North American Presentation Level Protocol Syntax, the vendor said.

There is no charge to users, according to the Genesys spokesman.

Further information is available from the Genesys Group, Third Floor, 1756 Courtwood Crescent, Ottawa, Ont. K3C 3J2.

## DATA COMMUNICATIONS · MICROS · TERMINALS

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## COMMUNICATIONS

# Bell South to introduce packet-switched net

By Phil Hirsch  
CW Washington Bureau

WASHINGTON, D.C. — A whole new way of retailing many mass market products and services will develop from PulseLink, a packet-switched network Bell South plans to introduce later this year.

That is the opinion of Walt Weyand, PulseLink's marketing manager, who was interviewed by phone last week after disclosing some details about the network at a conference held here a short time earlier.

PulseLink, he said, provides a way of operating a network of automated gasoline service stations from a cen-

tral location; it can update a retail chain's central inventory records whenever a clerk in a remote store makes a sale. PulseLink can also support home telephoning services, download software to personal computer users, read electric utility meters, monitor home security systems and interconnect banks with widely dispersed automatic teller machines. Many of these services, Weyand added, will be offered later this year in Atlanta, Charlotte, N.C., and/or Columbia, S.C. — the first three metropolitan areas in which Bell South plans to tariff PulseLink.

Weyand said that because users of

information-based services typically communicate in short bursts, a packet-switched net is better suited for this type of traffic than the circuit switch telephone net and that a greater number of terminals and users can be accommodated.

He added that because most users of on-line information services use nonpacketizing terminals, it is necessary for the network provider to include end-to-end protocol/code conversion as part of the service. This is not possible, though, according to Weyand, because of the Federal Communications Commission's Second Computer Inquiry decision. Specifi-

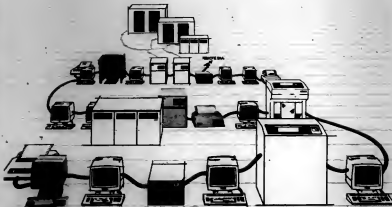
cally, Computer Decision II says that AT&T and the now-divested Bell operating companies can offer end-to-end protocol/code conversion only if they do so through separate subsidiaries or obtain a new license from the commission for each service offering.

If Bell South cannot include end-to-end protocol conversion as part of its PulseLink service, Weyand said, "our revenue stream will be reduced substantially."

AT&T, contending that divestiture made the waiver process unworkable, has asked the FCC for rules that would permit it "to provide code and protocol conversion on the same unrestricted basis as other carriers," for example, GTE, which through its Telnet subsidiary, operates a nationwide packet-switched network. A number of former Bell operating companies have supported the petitions.

But several organizations representing intelligent terminal makers and vendors of on-line information services contended that the waiver provision should be retained. As the Association of Data Processing Service Organizations, Inc. put it: "The adverse consequences . . . alleged to flow from the [FCC's order] are more imagined than real. . . . (The commission) should expressly prohibit, without a waiver, the provision of code and protocol conversion services by AT&T and the former Bell operating companies to facilitate interconnection between disparate terminals."

Weyand said last week that Bell South plans to seek a Computer Decision II waiver for PulseLink soon. Almost certainly, the other former Bell operating companies that submitted comments late last month have similar services under development. Thus, the commission's consideration of the Bell South application could affect how quickly PulseLink-type networks become available elsewhere.



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## Net 25 family fits CCITT X.25

Telecommunications International, Inc. has introduced the Net 25 family of packet-switching nodes compatible with CCITT X.25.

The Net 25 family includes concentrator nodes, secondary nodes and backbone nodes, with throughput rates of up to 900 switched packets per second.

The Net 25/100 is the entry-level packet-switching node, ideally suited for use as a concentrator node, the vendor says. It has a throughput of up to 100 (128-byte) switched packets per second. It features up to 16 CCITT X.25 access lines, providing standard RS-232C interface with channel rates up to 19.2K bit/sec, 1M byte of memory and 8M bytes of local disk storage.

The Net 25/200 (primary node) has the capability to expand to a backbone node, according to the vendor. It has a throughput of up to 200 (128-byte) switched packets per second.

See NET page 72



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## COMMUNICATIONS

# Novell testing its file server software

OREM, Utah — Novell, Inc., a designer and supplier of software for local-area networks, has begun benchmarking its file server operating system against the file server software supplied by vendors of local-area networks.

The company will compare the performance of eight local-area networks as they provide IBM Personal Computers and work-alikes with access to files in a shared Winchester disk drive.

"Preliminary tests were run on a stand-alone IBM Personal Computer XT) to establish a set of starting-point measurements," the company reported, and then timing tests were

conducted twice on each network — once with the local-area network manufacturer's own server software and again with the software provided by Novell.

Local-area networks included in the test are Corvus System, Inc.'s Omninet; Davong System, Inc.'s Multi-Link; Gateway Communications, Inc.'s G-Net; SCom Corp.'s Ezhlink; Orchid Technology, Inc.'s PC-Net; Protoson Associates, Inc.'s Protoset; Nestor Systems, Inc.'s Arcnet; and Novell's Netware/8.

The benchmark will include 128K-byte and 512K-byte read and write tests; a 365K-byte record write test; create, write and delete tests; and

save and copy tests using Wordstar test. In each test, the elapsed time in seconds is recorded as the performance data, according to Novell.

The benchmarks are meant to "illustrate that performance is not only a function of hardware, but software as well," a company spokesman said. "For the first time in a network environment, there is a common denominator capable of increasing performance on all local-area networks while maintaining uniform functionality across all topologies."

Additional information is available from Novell, located at 1170 N. Industrial Park Drive, Orem, Utah, 84057.

## MULTIPLEXERS/ MODEMS

### GANDALF DATA, INC. GLM 528; GLM 510

Gandalf Data, Inc. unveiled two new products at Interface '84 that it has added to its Line Miers family of multiplexers.

The GLM 528 is said to be optimized to connect a large number of personal computers or other devices to the company's PACX data network switch or directly to a host via a local or long-haul T1 (1.544 mb/sec) link.

The GLM 528 is said to cost \$35 to \$40 per channel and is scheduled to be shipped in April.

Gandalf also announced the GLM 510, a device with an integral modem, that supports four or eight asynchronous channels over a four-wire circuit that operates at speeds up to 9.6K b/sec.

Prices range from \$375 for the module versions compatible with the company's PACX switch to \$400 for the stand-alone, eight-channel model. Gandalf Data, 1019 S. Noel, Wheeling, Ill. 60090.

### EMULEX CORP. C802 series multiplexers

Emulex Corp. has announced the C802 series communications multiplexers for Digital Equipment Corp. processors.

According to the vendor, the product comes in two models: the C802/BA is designed to work with the LSI-11/23 and LSI-11/23 Plus processors, and the C802/HB works with the Micro/PDP-11 computer.

Both the C802/BA and C802/HB are list-priced at \$2,500.

Emulex, P.O. Box 8725 2545 Horner Blvd., Costa Mesa, Calif. 92626.

## NET from page 70

The backbone node, the Net 25/400, features up to four high-speed trunk channels, up to 16 OCITT X.25 access lines, 1M byte of memory and 5M bytes of local disk storage.

Additional nodes include the Net 25/800 High-Performance Backbone Node, the 25/SP Switching Pad and the Net 25/SN Supervisory Node. Prices range from \$20,000 for an entry-level configuration to \$300,000 for a full configuration.

Telemetrics International is located at Crown Center, 1416 N.W. 62nd St., Fort Lauderdale, Fla. 33309.

## FROST from page 69

Only enhanced networks hold the promise of truly distributed data processing," the report states.

The study also analyzes and forecasts equipment demands of enhanced-service carriers. In current dollar terms, data circuit terminations equipment purchases, estimated at \$36 million in 1983, are expected to reach \$160 million in 1986. Switching node equipment spending by these carriers will climb from \$24 million to \$120 million over the same time period, and data termination equipment spending will expand from \$14 million to \$30 million.

The report (No. 1224) costs \$1,400 and is available from Frost & Sullivan, 106 Fulton St., New York, N.Y. 10038.

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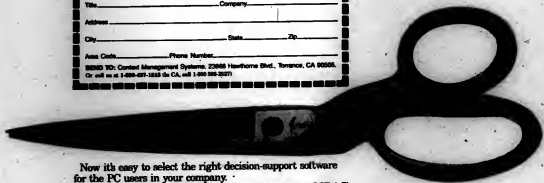
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# SYSTEMS & PERIPHERALS

## Gould unveils trio of design systems

By Tom Henshaw  
City Staff

FORT LAUDERDALE, Fla. — Gould, Inc.'s Computer Systems Division recently announced a 33-bit graphics system, the PFS1000 (79) 5000, and two turnkey computer-aided design and manufacturing (CAD/CAM) workstations, the PFS1000 2100 and 5100.

Based on the Unix operating system, the PFS1000 was designed for compute-intensive electrical, mechanical, architectural and engineering design applications. It incorporates a 33-bit supermini-processor and a dedicated graphics processor packaged in a single cabinet, the vendor said.

The unit's CPU can accommodate up to 10M bytes of virtual memory, up to 52K bytes of cache memory per processor and the ability to interface main memory. The system was designed around Gould's synchronous bus architecture, the Selbus, which features a 56.7M-byte data transfer rate, the vendor said.

Other features reportedly include instruction and operand prefetch, a four-stage instruction pipeline, base register support and a variety of peripherals.

The PFS1000 includes an integral 80M-byte Winchester disk subsystem, consisting of a disk drive, power supply and disk processor. Data backup is achieved



Gould's PFS1000 graphics workstation

through a removable 60M-byte cartridge magnetic tape subsystem, which includes a tape drive, power supply and tape processor, the vendor said.

The PFS1000 supports the firm's UTX/32 operating system, which contains features of both the Bell Laboratories and the University of California at Berkeley versions of Unix, according to the vendor.

The unit's graphics subsystem is a parallel interface to the CPU that displays both color and monochrome graphics out-

put from the PFS1000. It consists of a 19-in. color display monitor, keyboard and mouse, the vendor said.

An I/O processor operates independently and in parallel with the CPU and generates a 16-bit asynchronous I/O bus that can transfer data at up to 1.6M bytes/sec, the vendor said.

A basic PFS1000 base enclosure consists of two 1M-byte integrated memory modules, an 80M-byte Winchester disk subsystem, a 60M-byte tape subsystem, a graphics processor, keyboard, mouse and a power supply. It costs \$69,000. The base enclosure reportedly can be expanded to include an additional 80M-byte disk drive, up to 64M bytes of physical memory, 16 serial communications ports, a hardware floating-point accelerator and a link to Xerox Corp.'s Ethernet local-area network. The product is available 90 days after receipt of order.

For CAD/CAM manufacturing applications, Gould has announced the PFS1000 and PFS100. The units are turnkey systems aimed at mechanical designers.

The PFS100 was designed around Gould's PFS3000 16/32-bit processor and includes a color graphics interface and a graphics processor. Similarly, the PFS100 is based on the firm's 33-bit PFS4000 virtu-

See Gould page 81

## Locom add-in memory unit targets IBM processors

SAN JOSE, Calif. — Locom Corp. has announced the LCM-400, an add-in memory unit for IBM's 4331, 4341 and 4361 processors that can expand the maximum main memory capacity of those systems to 16M bytes.

Available in memory configurations ranging from 1M to 16M bytes, the LCM-400 is reportedly identical to the memory expansions available

from IBM. The vendor claims that by extending the main memory capacity of the 4331, 4341 and 4361 processors beyond the IBM maximum, users can avoid upgrading their systems to larger IBM processor models.

The LCM-400 memory costs roughly \$6,000 per 1M byte in small memory configurations, such as 2M bytes. When pur-

See Locom page 81

## IPL Systems, Sorbus reach maintenance agreement

WALTHAM, Mass. — IPL Systems, Inc., a manufacturer of a line of mid-range processors that is compatible with IBM's 4300 series processors, recently announced it will use the Sorbus Division of Management Assistance, Inc. to provide maintenance on IPL systems.

Under the agreement, Sorbus will maintain all domestically installed IPL processors.

Further, IPL's maintenance technicians have been transferred to Sorbus. IPL said it is training Sorbus employees to maintain IPL systems.

While Sorbus will provide local customer service, IPL said it still retains full responsibility for the performance of its products. IPL will continue to maintain its remote diagnostic facility at its headquarters.

See IPL page 81

## Report predicts '84 sales of computer systems to hit \$52.5 billion

By Edward Warner  
City Staff

WELLESLEY, Mass. — Total sales of the American computer industry will reach \$92.4 billion this year, an increase of almost 16% over 1983, according to a report released by Venture Development Corp., an industry consulting firm here.

The lion's share of those sales, \$52.5 billion, will go to the manufacturers of computer systems, an increase of \$6.1 billion over last year, the report said.

The report, which provides sales projections for 40 categories of computers and computer industry products produced in the U.S., is based on personal interviews with executives from American computer manufacturers and roughly 500 questionnaires returned by computer product users, said Mark Rudov, a Venture

Development senior consultant.

Other market segments covered by the report were data storage systems sales, expected to rise \$2.1 billion over last year to a total of \$12.7 billion, and sales of terminals, which will rise to \$7.5 billion from \$6.5 billion last year. The sales of printers and plotters, the report said, will rise by roughly \$1 billion, from \$7.3 billion in 1983 to \$8.5 billion this year.

Software and services, meanwhile, will rise \$2 billion in sales from 1983 to \$11.7 billion this year.

In all, the industry is expected this year to continue its 15.9% annual growth rate since 1980, the report said. That rate, Rudov estimated, will be sustained "at least until the end of the decade," due to what he called the failure of most firms to adopt the efficiencies of office automation.

Mirroring that annual industry

growth rate is the annual growth rate since 1980 in the sales of printers and plotters, the report said. The report pegged that rate at 16.4% and noted that strong growth in that industry was being shown by line printer shipments, with an annual rate of 15%, and dot-matrix printers, with an annual rate of 14.6%.

Page printer shipments, the report predicted, will reach nearly \$600 million this year, with the average selling price dropping nearly 50% from its 1980 level to around \$130,000. That price, Rudov estimated, is probably not likely to continue its steep plunge because a point will come where "you won't attract more customers with a lower price."

Another area seen undergoing rapid growth by the report was that of printer/plotter shipments. Booming at a compound annual rate of 33.7%,

the report said, shipments of those units will more than triple their 1980 sales level to \$623.1 million this year. That boom, Rudov explained, is likely due to the market's increased interest in graphics and the greater availability of graphics software.

Plotter shipments, the report said, are likely to rise to nearly \$400 million this year, with the sale of flatbed plotters topping the list.

Most buyers of the report, titled "The U.S. Computer Industry, Second Edition," will be U.S. manufacturers of computers, peripherals and software, Rudov noted. "They'll use it," he said, "to give themselves a better handle on where their industry is going."

The 300-page, hardbound report is available for \$1,050 from Venture Development, One Washington St., Wellesley, Mass. 02151.

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## SYSTEMS &amp; PERIPHERALS

## DATA STORAGE

## AVIX CORP.

## Maxfile series

Avix Corp. has introduced a family of plug-compatible storage systems for selected Digital Equipment Corp. Mainbus, Ultrabus and Q-bus-based processors. The Maxfile series reportedly features storage peripherals from Control Data Corp., Cipher Data Products, Inc. and Fujitsu Ltd. packaged in a 48-in. cabinet. Disk selections include both fixed and removable media, with data transfer rates of up to 1.8M byte/sec and storage capacities ranging from 80M to over 30 Tbyte/cabinet.

Tape selections include front- and top-loading units with streaming and start/stop capabilities. Phase-encoded (1,600 bit/in.) recording is available for file transfer and software distribution and group-encoded recording (835 bit/in.) is used for high-speed backup of large files, the vendor said.

The Maxfile series is available in six configurations, and prices start at \$4,800, a spokeswoman said. *Avix, 86 Cummings Park, Woburn, Mass. 01801.*

## PRINTERS/PLOTTERS

## DIGITAL MATRIX CORP.

## Perewriter 9/133

Digital Matrix Corp. has announced a 133-cpi dot matrix forms printer designed for uses where multi-part, continuous forms are printed individually or in the demand-document mode.

The Perewriter 9/133 performs like a journal printer, requiring no special programming or instruction codes for normal operation, according to the company.

It reportedly eliminates manual alignment of forms in order to print single documents such as numbered forms or checks. Depressing the tear-form button advances the paper so that either the last line printed or the head-of-form is brought to the tear bar for separation, while releasing the button returns the head-of-form to the print head and allows printing within 1/6 in. of the top or bottom of the sheet, according to the company.

The printer was designed for sale through OEMs, systems houses and distributors.

Evaluation units are available now for \$1,295.

Digital Matrix, 105 Filley St., Bloomfield, Conn. 06002.

## DIGITAL EQUIPMENT CORP.

## LN01 Post Utility; LN01 Soft Post Library

Digital Equipment Corp. has announced enhancements designed to let users of its LN01 laser printer select from a variety of mono-spaced and proportionally spaced typefaces.

The LN01 Post Utility and the LN01 Soft Post Library are intended to help LN01 laser printer and VAX-11 superminicomputer users produce professional-quality printing in the office without typesetting equipment.

The LN01 Post Utility reportedly provides access to any type font —

typeface, size or weight — from the LN01 Soft Post Library. The utility is said to describe available fonts, print a text file using a specific font or series of fonts or produce the LN01 printer with the fonts to be used for the day's printing.

Editing features reportedly create new characters or modification of characters for special usage, such as bullets for reports and presentations, unusual characters or character combinations for building unique symbols or logos.

The utility runs under DEC's VMS operating system on the VAX-11/730, 750, 760 and 780 systems that include the LN01 printer and have 256K bytes of random-access memory.

The LN01 Soft Post Library reportedly converts widely used proportional and mono-space type families in various sizes and weights. Type sizes are said to range from six to 36 points. Most type families reportedly feature a multinational character set.

The company reported that several packages, such as basic office, office upgrade and complete office are scheduled to be available in March. Other packages are designed for pricing directories, listings, technical papers, newsletters, management reports and catalogs.

Pricing for the LN01 Soft Post Library range from \$1,025 to \$1,850. The LN01 Post Utility is priced at \$2,000.

DEC, Maynard, Mass. 01754.

## GRAPHICS SYSTEMS

## LYNXYS, INC.

## Lynxsystem 1000

Lynxys, Inc. has announced a hardware and software system designed to allow attachment of interactive graphics devices to Control Data Corp. Cyber 170 minisystems.

Lynxsystem 1000 reportedly improves the performance of highly interactive applications by offloading the user interface portion of an application from the mainframe. The system's multiple microcomputers act as dedicated, programmable controllers for interactive graphics devices that traditionally cannot be connected to the mainframe, the vendor said.

The system is based on a high-speed bus with a Cyber 170 channel interface. Depending upon the configuration, the bus may use from two to five single-board Motorola, Inc. 68000-based microcomputers, each including 128K bytes of dual-ported memory, two serial ports and an I/O expansion bus to which multiple parallel ports may be attached.

Device adapters attach to the expansion bus to accommodate graphics and other peripheral devices.

The minimum configuration, the Lynxsystem 1002, is priced at about \$25,000, including software.

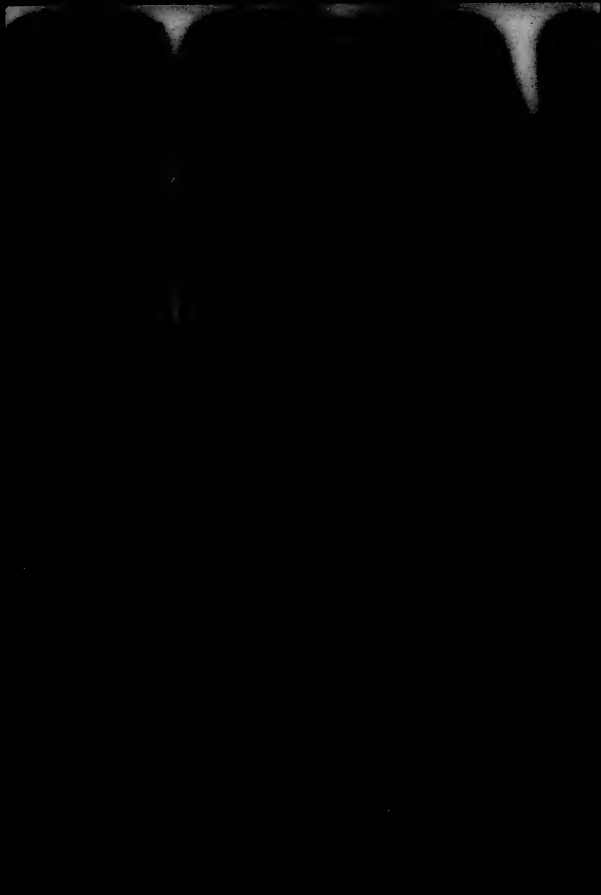
Lynxys, P.O. Box 3, West Lafayette, Ind. 47906.

## POWER SUPPLIES

NOVA ELECTRIC MANUFACTURING CO.  
Ministar UPS

Nova Electric Manufacturing Co. Continued on page 88







## SYSTEMS &amp; PERIPHERALS

Continued from page 76

has introduced its 1-kVA Mintaur un-interruptible power system (UPS) with batteries and a 14-cycle transfer switch in a 7-in.-high module.

The Mintaur UPS is designed for operation of a variety of equipment including microcomputers, communications equipment, CATV systems, word processors, point-of-sale terminals, process-control equipment and computer-aided design and manufacturing systems.

The system can operate at 160% of its 1-kVA rating for short time periods, the company said. In addition, for loads such as motors, disk drives or transformers, the system is said to provide up to 10 times overload through automatic operation of its static transfer switch. The switch returns to normal operation automati-

cally when the overload condition has been overcome, according to the vendor.

The Mintaur handles I/O voltages ranging from 120 Vac to 240 Vac and has output frequencies of 60Hz and 60Hz. The Mintaur Model 11-1K60-Y11 is priced at \$3,700.

Novus Electric Manufacturing, 263 Hillside Ave., Nutley, N.J. 07110.

#### LAMBDA ELECTRONICS LT series

Lambda Electronics has announced a series of eight power supplies designed for use in laboratory, testing and systems applications.

The LT series reportedly provides up to 60V and up to 300A and comes with built-in overcurrent protection and dual, digital meter readout for volt-

age and current. The products are said to be compatible with Lambda's IEEE-488 standard, computer-programmable power system.

The power supplies are grouped in either the LT-800 series, with a 65% efficiency at maximum output voltage, or the LT-820 series, with a 70% efficiency at maximum output.

The LT-800 series is priced at \$1,650, and the LT-820 series is priced at \$2,900, the vendor said.

Lambda Electronics, 515 Broad Hollow Road, Melville, N.Y. 11747.

#### AUXILIARY EQUIPMENT

##### GOULD, INC. 884A-200

Gould, Inc. has announced an addi-

tion to the 884 family of programmable controllers used in small to mid-size control systems — the Model 884A-200.

With a 75% increase in memory size, the enhanced model is said to offer increased user logic storage capacity from 3,000 nodes to 3,500 nodes of relay ladder logic.

In addition, it reportedly provides for the storage of over 1K numerical quantities (registers) and an additional 1,024 on/off (discrete) variables, for a total memory capacity of nearly 5K 16-bit words. Comprised of a series of individual components, the 884A-200 permits the user to tailor the system to meet specific needs, the vendor said.

Basic features include battery back-up for the Onco random-access memory, a memory-protect switch and a low battery power indicator.

The 884A-200 is priced under \$2,000.

Gould, P.O. Box 3083, Andover, Mass. 01810.

#### APPLIED COMMUNICATIONS, INC. Base24-Stratus

Applied Communications, Inc. has announced that its Base24-ATM processing and switching software is now available for the Stratus Computer, Inc. Stratus/32 Continuous Processing System.

The Base24/Stratus system was designed for use by financial institutions requiring medium or small automated teller machine networks, according to the vendor.

Base24-ATM reportedly enables institutions to choose from three authorization procedures, allowing flexibility within shared electronic fund transfer environments.

It also is said to include a settlement and reporting module that shows the funds due each day among sharing institutions.

Prices for Base24-ATM start at \$145,000.

Applied Communications, 806 S. 106th Ave., Omaha, Neb. 68154.

#### PRO-LOG CORP.

##### Price reductions

Pro-Log Corp. has announced price reductions of up to 34% on its line of programmable read-only memory programmer products. The price cuts go into effect immediately.

Pro-Log's M980 is a portable control unit designed to use any Pro-Log plug-in personality module.

Prices for the M980 have been cut

Continued on page 81

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## SYSTEMS &amp; PERIPHERALS

Continued from page 80

from \$2,860 to \$1,550 for the 8K-byte version, from \$2,800 to \$1,850 for the 16K-byte version and from \$3,400 to \$2,250 for the 32K-byte version.

The PMS000 Universal Metallic Oxide Semiconductor Personality Module is said to support all five-volt metallic oxide semiconductor Frams and microcomputers. Its price has been reduced from \$1,800 to \$1,450.

The System 90 includes an M000 control unit, a PMS000 module, a S000 pin-out adaptor, an M304 adaptor for RS-232 communication and a carrying case. Its price has been cut from \$5,500 to \$2,900 for 8K bytes, \$5,800 to \$3,200 for 16K bytes and \$4,300 to \$2,280 for 32K bytes, according to the vendor.

Pro-Log, 3411 Garden Road, Monterey, Calif. 93940.

#### TECHTRAN INDUSTRIES, INC. TE-4 Transaction Recorder

Techtran Industries, Inc. has announced a retail management system designed to record sales transactions as they are generated by cashiers.

The TE-4 Transaction Recorder reportedly connects to standard electronic cash registers and records up to 8,000 16-char. lines on each cassette.

Individual recorders in a single- or multiple-store environment can be linked to a central processor or ser-

#### IPL from page 75

ters here, and IPL representatives have been placed in regional posts.

IPL said the move will allow it to offer its systems in more markets; it currently markets them in 13 domestic locations. IPL is located at 360 Second Ave., Waltham, Mass. 02154.

#### LOCOM from page 75

chased in larger increments, the cost is \$4,000. A 16M-byte configuration costs \$64,000. Locom is at 2360 Bering Drive, San Jose, Calif. 95131.

#### GOULD from page 75

al processor and also includes a color graphics terminal and graphics processor, the vendor said.

The two CAD/CAM systems offer the same basic functionality; however, the P85100 offers more performance and expansion capability. The P85100 offers the capability of adding a second terminal and is recommended for users who need extensive modeling capabilities, according to the vendor. The less powerful P85100 is recommended for drafting applications. Both systems use a mechanical CAD/CAM package acquired by Gould, but developed by Vulcan Software, Inc.

Available in July, the P85100 costs \$60,900, including a P85000 processor, graphics processor, the UTX/32 operating system and a drafting software package. A similar, by configured P85100 costs \$115,000. A dual-user P85100 system with a solid modeling package is priced from \$155,500.

Additional information is available from Gould, which can be reached through 8001 W. Sunrise Blvd., P.O. Box 9148, Fort Lauderdale, Fla. 33310.

vice bureau by telecommunications lines. The unit is said to allow a retailer to process data immediately at a central site, according to the company. The product also is said to allow retailers to hand-carry or mail cassettes to the data processing center if speed is less critical.

The TE-4 is available now for \$1,125.

Techtran Industries, 200 Commerce Drive, Rochester, N.Y. 14623.

#### COMPUSCAN, INC. Alphaword Series 80

CompuScan, Inc. has introduced its Alphaword Series 80 page readers, a group of three optical character readers that convert typewritten characters to electronic signals and transmit them to word processors,

computers, communications systems and typewriters.

All three models reportedly feature automatic formatting for word processing applications and were designed for users with low-to-moderate input requirements. Models A and B of the series are said to scan 146 pages an hour. Model C can reportedly scan 250 pages an hour.

The three models claim an accuracy rate of less than one substitution error in 250,000 characters and include self-diagnosis and an operator message display and menu, the vendor said.

Prices in the Alphaword Series 80 line begin at \$9,900 for the Model A, \$10,800 for the Model B and \$15,900 for the Model C.

CompuScan, Building 2, 81 Two Bridges Road, Fairfield, N.J. 07006.

#### PROFESSIONALS UNLIMITED "Insights into IBM System/36"

Professionals Unlimited has announced the release of a text written for DP personnel who either have or are considering the acquisition of an IBM System/36.

"Insights into IBM System/36" reportedly provides a technical education and performance tips for those who have an IBM System/36 and offers an independent appraisal of the system's features for those considering a move to the System/36.

The text was written by David Greenblatt, a System/36 consultant and president of DGC, Inc. It costs \$95.

Professionals Unlimited, 2851 Lantana Drive, Silver Spring, Md. 20903.



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How they've changed  
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What's new in networks, security,  
and micro-to-mainframe links.  
Closes May 4.



**AUGUST.**

Applications Software.  
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Productivity. User-friendly vs.  
ease-of-use. Plus plenty of  
product reviews.  
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# MICROCOMPUTERS

## Large firms want IBM logo Compatibles not garnering large business mart

By Paul Montemoretti  
CI Staff

Large companies shopping for microcomputers are more interested in the IBM logo than IBM compatibility, according to vendors, analysts and retailers interviewed recently by Computerworld.

Only one manufacturer of IBM-compatible microcomputers, CompuLink Computer Corp., garnered a significant percentage of the microcomputer market in 1983, according to Future Computing, Inc., a market research firm in Richardson, Texas. Corporate purchases made up a significant part of CompuLink's sales. "Most of our computers were sold to large companies," said Ken Price, director of corporate communications at CompuLink.

Corporate sales comprise a small percentage of other compatible manufacturers' revenues. "We have sales to large companies are a volume part of our business," said one retailer who carries Columbia Data Products, Inc. products. "Large companies look to the safe choice, the well-

known name when they make a purchase."

"According to our studies, the IBM name is very important to MIS managers," said Dr. Michael Elmes, vice-president at Future Computing. "Because of its limited availability, compatible manufacturers were able to sell their products."

IBM's corporate dominance is shown in a Future Computing survey of 76 Fortune 1000 companies. Forty-four companies signed volume purchase contracts for IBM Personal Computers, four signed contracts for Apple Computer, Inc. microcomputers and three signed volume purchase agreements for both Digital Equipment Corp. and Hewlett-Packard Co. personal computers. None of the compatible manufacturers had signed corporations to volume purchase agreements.

Compatible manufacturers acknowledge IBM's dominance. "It's obvious that IBM has set the predominant standard," said Jack White, vice-president of marketing and sales at Columbia Data of Columbia. See IBM page 15

■ Entry-level ship Office out for micro/84

■ IBM micro gets statistical software/84

■ IBM micro gets statistical software/84

Systems/84

Storage/84

Board-Level Devices/84

Assembly Equipment/84

Software/84



## How biased are micro reviews?

Nearly everyone trusts Consumer Reports because it goes to great lengths to emphasize its impartiality. But do microcomputer magazines that publish software reviews merit the same confidence?

Generally not. While there are several good, impartial publications out there that take special pains to present unbiased evaluations, the vast majority of them, according to computer magazine editors interviewed recently, they emphasized that it's important to get to know the publication before taking its software reviews too seriously.

The major problem is that, unlike Consumer Reports, most micro magazines rely on advertising for their livelihood. Conflict of interest may color product reviews.

"A lot of magazines are reluctant to knock a major advertiser," said Stan Yeh, editor-in-chief of Computer Shopper. "And I think I see more of it in the larger publications."

"Only a very few will publish bad reviews," said Stewart Alsop Jr., editor of *InfoWorld*. "We have lots of fear of it, but we do it. And we've lost ads because of it."

Unfortunately, choosing a reliable source for evaluations is no simple task. Alsop pointed out that many publications list new products and their functions in a format that resembles a review in form but not in content. Others simply don't publish bad reviews at all.

Last magazine editor Ted Leonard warned further that the perspective of an "expert" reviewer is often detrimental.

See REVIEW page 26

## HP continues charge into micro mart with debut of low-cost ink-jet printer

By Jeffery Becker  
CI West Coast Bureau

PALO ALTO, Calif. — Hewlett-Packard Co.'s drive to become a major force in the microcomputer field has entered its second phase, with the introduction of a thermal ink-jet printer that reportedly costs half as much as competing products offering comparable performance.

HP's 160 char./sec. Think Jet printer made its debut during a recent press conference at which the company dropped a few hints about additional micro products slated for introduction later this year.

HP Executive Vice-President Paul Eby characterized the two upcoming products as companions for HP's existing Model 150

micro. "They will complement rather than replace the 160 and will be at least as important," he said during post-conference questioning.

The first of the anticipated micro offerings will appear in May and will be followed by a second such product approximately a month later. Eby also confirmed the existence of a portable HP micro that is already "well along in development" in the company's laboratories, he said. The HP portable, whose costing introduction has been rumored for some time, will reportedly have a notebook-size footprint and rival the power of the Model 150.

Credited with concealing about as much

See HP page 36

## The answer to program piracy: hardware protection

By John Herod  
CI Staff

When most people think of computer crime, they recall cases of theft, embezzlement and data leaks that have occurred by means of computer manipulation. There is, however, a much larger area of computer crime in our industry today: the piracy of computer programs.

Many people who would not consider stealing goods from a store have no qualms about stealing information from programs. In fact, it has become socially acceptable to copy and use software illegally. What can the developer do to protect his investment? The best method, I believe, lies in a hardware technique.

Copyright laws have been virtually useless in guarding software. To date, there has been no clearly successful copyright infringement suit because the programs are overwhelming. First, the program's developer must find the illegal copier. This

is monumentally difficult in the era of software to use today. Even if the author thinks he has found a copy, it's hard to prove it. Just because a package does the same thing as another doesn't prove it's written exactly the same way. And even if the software developer can unquestionably establish piracy, it is unlikely that a settlement will enable him to recoup his legal costs.

Like copyright laws, other legal means of protecting software are very hazy. Contracts and licenses have been devised to intimidate, would-be pirates and aid in their prosecution. It is not clear, however, to what extent such schemes can be enforced.

"Public domain" is also a problem. Because knowledge cannot be owned, a developer must guard the source listings for his programs. If they are released, the program is in danger of becoming public property. Lawyers are advising clients on the con-

crete message to include in their purchase in order to protect this. Unfortunately, no two lawyers seem to have the same opinion.

Software developers have invented a number of in-house software and hardware schemes to secure their software. There are, however, two major traps in this. First, there are many computer whiz kids who regard the breach of any system as a challenge. And any system designed by a human is probably breakable by another human. The other danger is that the cost or complexity of the system will become a barrier to successful marketing.

One possible example of a protection system being too complex to be effective is copy-proof formats. These formats involve an obscure way of putting data on the disk, which would interfere with the standard way programs are used by the user. The major problem with this, however, is that copying is

also difficult or impossible for the illegal customer, making backing very costly. And copy-proof programs are not unbreakable. The programs must be readable in order to be read into memory for operating. Hence, they are accessible to a special copy program.

Some copy-proof programs also suffer from a "weak link" problem. Often a program has been made copy-proof and accessible at the same time. The pirate simply prints the program out on paper and loads it into another system.

Another protection method is nullification. Unusual information, written into the middle of the program, allows tracing to the person who bought the copy. The idea is to intimidate buyers as they will not allow their software to be copied. This, however, is one of the techniques' major failures. It is very hard to prove that the buyer allowed his

See PROGRAMS page 35

## MICROCOMPUTERS

## Forecasting, planning tool fits IBM Personal Computer

BURLINGTON, Mass. — Alpha Software Corp. has introduced its Econometric Software Package (ESP), a forecasting and planning tool designed for the IBM Personal Computer and compatibles.

According to the vendor, ESP allows the Personal Computer user to integrate, in a single program, full-functioned econometric and statistical analyses with graphics, data management and the ease-of-use of a personal computer.

The interactive, screen-oriented package allows the user to collect, store and display historical data,

compute a wide range of statistics and apply a full complement of regression techniques to estimate models and generate forecasts.

ESP requires 256K bytes of random-access memory and two double-sided disk drives. It runs under IBM's PC-DOS 1.1 or 2.0 and supports all hard disks and the Intel Corp. 8087 co-processor. A dot matrix graphics printer is needed to obtain a hard copy of ESP results, the company said.

ESP is priced at \$795.

Alpha Software is located at 30 B St., Burlington, Mass. 01803.

## Data base management system uses entity-relationship model

OTTAWA — Xantho Information, Inc. has introduced XIM, a data base management system that reportedly uses an entity-relationship data model.

An entity-relationship model is an extension to relational data models, according to a spokesman for the vendor.

Data dictionary, data maintenance language, query language, report writer and a user-designed forms facility are reportedly integrated into one package.

Applications are syntactically and structurally integrated, and there are

no boundaries between applications, according to the vendor.

XIM reportedly handles text and numerical and graphics data.

There are two variants of the program: one runs under Microsoft, Inc.'s MS-DOS operating system and costs \$1,500.

The second variant runs under Quantum Software Systems Ltd.'s QNX, a Unix look-alike operating system, and costs \$1,500, according to the vendor.

Xantho Information is located at 1785 Woodward Drive, Ottawa, Ontario K2C 6R1.

## SYSTEMS

### TEXAS MICROSYSTEMS, INC. TMS-IPC

Texas Microsystems, Inc. (TMI) has introduced a rack-mounted computer with shock-mounted components that is designed for industrial use. The unit is said to be compatible with the IBM Personal Computer.

The product, the TMS-IPC (Industrial Personal Computer), also features shock-mounted disk drives, a key-lock power switch for system security and an optional backup battery pack. It reportedly can tolerate up to 50% humidity and runs the following operating systems: Microsoft, Inc.'s MS-DOS; Digital Research, Inc.'s CP/M-86 and Concurrent CP/M-86; and Intel Corp.'s RMK 86.

The basic configuration, including the CPU, one diskette drive and a keyboard, is available for \$3,995.

TMI, 6330 Sterling St., Irving, Texas 75063.

## STORAGE

### DEAGON INDUSTRIES SP-66; SP-140

Deagon Industries has introduced a line of 65M-byte and 140M-byte hard disk systems for the IBM Personal Computer, Personal Computer XT and compatibles.

According to the vendor, the new line features a 30 msec average access time and 8 msec track-to-track, with 60 msec maximum, including settling.

Compatible with the IBM PC-DOS and Microsoft, Inc. MS-DOS 1.1 and 2.0 operating systems, the system is offered in two models: the SP-66 and SP-140, offering 65M-byte and 140M-byte storage, respectively.

The SP-66 is priced at \$4,995; the SP-140 is \$6,995.

Deagon Industries, 35 Main St., Hopkinton, Mass. 01748.

### BOARD-LEVEL DEVICES

#### APPLIED CREATIVE TECHNOLOGY, INC. Printer Optimizer

Applied Creative Technology, Inc. has announced the Printer Optimizer, an electronic printer spooler for microcomputer users.

Continued on page 85

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## MICROCOMPUTERS

Continued from page 54

The Printer Optimizer is a hardware device that physically connects between a computer and one or more printers. According to the company, it provides separation of computer and printer functions and gives the operator control over the order in which jobs are printed, stopping for paper changes when necessary.

The Printer Optimizer can act as a liaison between any mix of computer system and several printers, regardless of whether they are electronically and code-compatible, the company noted. The speaker can translate English language into foreign characters, provide access to a dot matrix printer's various type fonts and colors and create graphics.

The Printer Optimizer can also be used with a modem as a stand-alone

data receiver or transmitter. Storage capacity is expandable from 64K bytes to 256K bytes.

The Printer Optimizer costs \$490. Applied Creative Technology, 2156 W. Northwest Highway C-305, Dallas, Texas 75220.

DATACORP CORP.  
ACS-2A

Datatron Corp. has introduced an STD-bus microcomputer called the ACS-2A. The Zilog, Inc. Z80-based single-board computer is compatible with the Mostek, Inc. CPU-2A, using the same configuration areas and mapping read-only memory, but with several enhancements to decrease cost and increase reliability, the company claimed.

The ACS-2A has six 28-pin, byte-

wide sockets, increasing on-board memory to 128K bytes. Memory expansion through the STD-bus Momez line is supported with a hardware memory management system compatible with Digital Research, Inc.'s CP/M 3.0. Expanded I/O is also supported.

Prices are \$195, \$235 and \$250 for the 2.5, 4 and 6 Mhz versions.

Datatron, Box 460, 1558 Ave., Lake Oswego, Ore. 97034.

## AUXILIARY EQUIPMENT

## TOPAZ, INC.

Powermaker Micro UPS

Topaz, Inc. has introduced an uninterrupted power supply for mi-

crocomputers. The unit, called Powermaker Micro UPS, is said to provide up to 75 minutes of stand-by as power in the event of a blackout and also reportedly protects against voltage sags and brownouts.

Powermaker Micro UPS fits underneath the workstation and reportedly includes a line-loss alarm to warn when the unit has switched to battery power.

The price supply is available in models with power ratings of 400, 800 or 1,000 Vac, priced at \$750, \$880 and \$995, respectively.

Topaz, 3555 Ruffin Road, San Diego, Calif. 92123.

## IMAGING TECHNOLOGY, INC.

PC Vision Frame Grabber

Imaging Technology, Inc. has announced the PC Vision Frame Grabber, a real-time, video image acquisition and display module for the IBM Personal Computer and Personal Computer XT.

According to the vendor, the product includes a hardware module that plugs directly into an expansion slot in the IBM Personal Computer, software routines, documentation and all required interconnecting cables.

The Frame Grabber converts a camera's RS-170 analog video signal to digital data at a 10-MHz rate and stores the resulting data in an on-board frame memory, the company said.

The Frame Grabber is priced at \$2,995.

Imaging Technology, 600 W. Cummings Park, Woburn, Mass. 01801.

## TOPAZ, INC.

Line 3 Power Conditioners

Topaz, Inc. has introduced a series of single-phase power conditioners featuring an internal microcomputer that reportedly monitors and corrects fluctuations in voltage.

The Line 3 Power Conditioners are said to have a narrow output-voltage-regulation band, a shielded internal noise suppressor and operating frequencies of 50Hz and 60Hz.

They come in several power ratings and prices. The 16 kVA model costs \$430; the 1 kVA model, \$545; the 2 kVA model, \$925; the 3 kVA model, \$1,285; the 5 kVA model, \$1,585; the 7.5 kVA model, \$1,910; and the 10 kVA model, \$4,000.

Topaz, 3555 Ruffin Road, San Diego, Calif. 92123.

## SOFTWARE

## FOX RESEARCH, INC.

10-Net compatibility

Fox Research, Inc. has announced that Sperry Corp.'s personal computer, the Sperry PC, can use Fox Research's 10-Net local-area network.

Each 10-Net network package reportedly includes all hardware, software and documentation needed to link an IBM Personal Computer, a Personal Computer XT or another compatible machine with other 10-Net-based microcomputers. 10-Net reportedly does not require any dedicated network server hardware and is said to feature several levels of data access authorization to ensure file security.

10-Net operates under IBM PC-DOS 2.0 and is available for \$695.

Continued on page 59



## You Can Read Some of the Dumps... Some of the Time...

In the past, programmers had to stare over monumental stacks of paper to resolve abends.

Trying to convert hexadecimal numbers like four aaron and seven or debating over where the abend occurred was as tough as spelling loge.

But then was brought forth a new notion — Abend-AID. It was a great moment in dump history. Programmers were emancipated as the drudgery of solving abends was abolished. They were free to devote their time to more productive tasks.

Abend-AID transfers the burden of debugging from the programmer to the computer. Abend-AID output shows What Happened, When It Happened, Where It Happened and supplies the necessary supporting data in an easy-to-use format that can almost fit on the back of an envelope (10-12 pages, in English).

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COMPUWARE  
ENTERED SOFTWARE THAT MAKES SENSE





## MICROCOMPUTERS

Continued from page 89

introduced Nutshell, an information manager software package that enables microcomputer users to store and retrieve data in almost any format, to browse through stored information and to exchange data with word processors, spreadsheets and other programs, according to the vendor.

Nutshell was designed for the Leading Edge Personal Computer, Compaq Computer Corp.'s Compaq computer, the IBM Personal Computer and compatibles. It runs under IBM's PC-DOS version 1.1 or 2.0 with 198K bytes of random-access memory and one double-density disk drive.

Nutshell is priced at \$395.

Leading Edge Products, 55 Providence Highway, Norwood, Mass.

## 82052

## MICRO-CLEAR, INC.

Ducor

Micro-Clear, Inc. has introduced a security system called Ducor for the Ashton-Tate Dbase II data base management system.

The Ducor system reportedly provides two levels of security by requiring Dbase II users to enter both a password and an identification number when they use Dbase II. The system does not require Dbase II users to reenter their password and identification number as they access each Dbase II program, but can be used to restrict automatically certain users from some programs, according to the vendor.

The Ducor security system is

available for \$99, including documentation and installation instructions.

Micro-Clear, 548 Madison Ave., New York, N.Y. 10017.

## SOFTWARE PRODUCTS INTERNATIONAL

Open Access

Software Products International (SPI) has released its integrated business management software package for the IBM Personal Computer and compatible systems.

Called Open Access, the package is built around a relational data base management system and offers word processing, spreadsheet, three-dimensional graphics, telecommunications and time management functions.

The relational data base allows the user to join elements of the five modules. All interaction with the information manager module is performed in English query language syntax, the vendor claims.

Open Access retails for \$995.  
SPI, 10500 Serrano Valley Road, San Diego, Calif. 92121.

## IT/SOFTWARE

Shorvik/Mallit

IT/Software, a division of Martin Marietta Data Systems, Inc., has added a document transfer program and a business graphics package to its IT series of microcomputer software for the IBM Personal Computer and compatible systems.

Shorvik, the business graphics package, provides a range of standard graphics features, including pie charts, bar charts and graphs, plus additional capabilities such as three-dimensional pie charts, pyramid charts and slide show preparation, according to the vendor.

Mallit is said to provide IBM 3270-type communications capabilities among Personal Computer users. Users can prepare memos, tables, schedules and other documents using programs in the IT series or other Personal Computer software and then transfer the documents to the mainframe, where they are available for downloading to selected recipients, the vendor said.

Both Mallit and Shorvik are menu-driven and offer on-line help and English error messages, the company claimed. Shorvik costs \$250. Mallit is priced at \$200, with volume discounts available.

IT/Software, P.O. Box 3308, Princeton, N.J. 08540.

## QUALITY INFORMATION SYSTEMS

Data Path/Informaster

Quality Information Systems (QIS) has announced an add-on enhancement module for its QIS Executive package.

The Data Path/Informaster module, when used in conjunction with a file transfer program, enables the user to poll information from existing data centers and automatically transmit it into standard QIS format, a spokesman said.

QIS Executive is menu-driven and is designed for data tracking in office automation applications with IBM/OS/2 and operating systems such as Unix, Microsoft, Inc.'s MSDOS, IBM's OS and Wang Laboratories, Inc.'s VS.

The module costs \$95 and is available.

QIS, Suite 205, 8901 Bayview Highway N.E., Atlanta, Ga. 30329.


## HAWKYE GRAPHICS

IBM

Hawkeye Graphics has introduced its electronic mail manager (EMM), a software application program for coordination of communications between multiple business offices.

EMM provides facilities for management of a private electronic mail network in conjunction with Hawkeye Graphics' Commnet communications exchange software, according to the company.

EMM is written in Ashton-Tate's Dbase II. The full-screen menu editor allows preparation of memos for



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## MICROCOMPUTERS

Continued from page 90

broadband to other mailbox destinations.

The introductory price of an IBM master/slave pair is \$400. Each successive slave branch module costs \$100.

**Hewlett-Packard, 20014 Mobile, Canoga Park, Calif. 91307.**

#### PACIFIC BASIN GRAPHICS PBG 200

Pacific Basin Graphics has introduced the PBG 200 business graphics package, a Unix-version menu-driven program that reportedly produces color and black-and-white slide displays, including pie charts, stacked and clustered bar charts, three-dimensional bar charts as well as line graphs.

PBG 200 runs on Intel Corp. 8088- and Motorola, Inc. 68000-based computers and on Digital Equipment Corp. VAX-11 computers. The program supports more than 35 peripherals and can be adapted for a variety of configurations, the company said.

PBG 200 Business Graphics sells for \$505. The Subroutine Library is priced at \$995.

When purchased together, the total cost is \$1,395, the vendor said.

**Pacific Basin Graphics, Suite 5, 730 York St., San Francisco, Calif. 94110.**

#### MORGAN COMPUTING CO., INC. Professional Basic

Morgan Computing Co., Inc. has introduced a 16-bit version of Basic

which, it claimed, can access the full memory of the IBM Personal Computer.

The new language, Professional Basic, is reportedly a window-oriented system of more than 4,000 tracing and debugging screens, two of which can be displayed at a time. Users are said to be able to view changes in variables or array elements and in the progress of FOR/NEXT loops.

A syntax checking feature is also included, the vendor said.

Professional Basic for the IBM Personal Computer is written in assembler, requires 256K bytes of random-access memory and sells for \$345, according to the vendor.

**Morgan Computing, Suite 210, 10400 N. Central Expressway, Dallas, Texas 75251.**

#### JETSOFT, INC. Jet III

Jetsoft, Inc. has announced Jet III, an integrated application generator and data base manager.

A menu-driven program generator writes code for file maintenance, transaction processing and reporting, the vendor said. The package accommodates relational, hierarchical and network data base structures and integrates with Jetsoft's general ledger, payroll, accounts payable and accounts receivable modules.

The system runs under Digital Research, Inc.'s CP/M, Concurrent CP/M and MP/M operating systems, as well as Microsoft, Inc.'s MS-DOS operating system. A single copy of a six-user system costs \$40,900.

**Jetsoft, 170 Main St., East Palmdale, Calif. 93534.**

#### PTRAMED DATA, LTD.

**Number Cruncher updates**

Pyramid Data, Ltd. has announced that its Number Cruncher software series now runs on Digital Equipment Corp.'s Rainbow, Eagle Computer, Inc.'s Eagle XL and Spirit; and Tandy Corp.'s Tandy 8000 microcomputers.

The Number Cruncher series consists of four programs: Number Cruncher I, Number Cruncher II, Number Cruncher III and Run Time. The series provides the user with a fourth-generation programming language that allows the user to develop software applications that meet his requirements, the vendor claimed.

Prices for individual programs range from \$99.95 to \$499. **Pyramid Data, P.O. Box 10116, Santa Ana, Calif. 92711.**

#### SOFTTECH MICROSYSTEMS, INC. UCSD Pascal compiler; P-system; Insight Window Debugger

Softtech Microsystems, Inc. has introduced a bundled development package for the Digital Equipment Corp. Rainbow computer. Included in the package will be a UCSD Pascal compiler to permit programmers to write in UCSD Pascal.

Also included will be the firm's P-system, a portable microcomputer operating system, and Insight Window Debugger, a windowing tool kit. The P-system reportedly was designed for text processing and application execution. The Insight program is said to provide windowing capabilities and enhancements for multiapplication integration.

The package is available for \$390. **Softtech Microsystems, 16555 W. Bernardo Drive, San Diego, Calif. 92127.**

#### AES DATA CORP.

**Office productivity software**

AES Data Corp. has announced several new programs to run on its Sevin 7100 Personal Work Station or its Sevin 7300 Office Support System.

Inter-User Messaging, available as an option on the AES 7300, allows users to send messages to other users within a cluster system or on the AES Multi-Link network, according to the vendor. A spelling verification program, for both the 7100 and 7300, is said to provide a dictionary of thousands of common English words. The Operator Assist software, available at no cost as part of the 7300 system.   
Continued on page 94



### IT'S WHEN NO ONE KNOWS THERE'S BEEN ONE.

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## MICROCOMPUTERS

continued from page 93  
only, reportedly presents instructions and assistance at the bottom of the display screen to aid users.

The Systems Activity Management software, available for both models, reportedly permits users to determine the burden on a system and the number of terminals in use. The Work Group Activity Management software, available for both models, allows work done on a terminal to be charged to specific account numbers, the vendor said.

Inter-Unit Messaging, Systems Activity Management and Work Group Management are priced at \$600; the spelling verification program is available for \$1,000.

ALT Systems, P.O. Box 10872, 9 W. Broad St., Stamford, Conn. 06904.

## ALPHA COMPUTER, INC.

Add-Net

Alpha Computer, Inc. has introduced Add-Net, an interface and software package that allows Kaypro Computer Corp. Kaypro portables and Eagle Computer, Inc. Eagle 2 computers to plug into a high-speed local-area network.

According to the vendor, Add-Net allows personal computers to operate as intelligent workstations on an Alpha-Net local-area network, which provides electronic mail and access to other workstations, peripherals and software.

Alpha's C24-4001 network master costs \$1,195; Muxys Corp.'s TurboDOS operating system costs \$750. One master computer will support up to 256 workstations, with any mix of Alpha workstations or microcomputers, a spokesman said.

Add-Net, including software, is priced at \$695.

Alpha Computer, 477 Division St., Campbell, Calif. 95008.

## COMPUTING CAPABILITIES CORP.

Dual/150

Computing Capabilities Corp. has introduced the Dual/150, a program that allows a Hewlett-Packard Co. HP 150 touchscreen personal computer to operate simultaneously as two terminals connected to two different computers or communication lines.

According to the vendor, the program creates two independent work spaces within one HP 150 and connects each to one of the two RS-232C ports.

Each of the work spaces functions as a complete HP 150 terminal, providing both block and format mode capability, a spokesman said.

Dual/150 is priced at \$295.

Computing Capabilities, Suite 233, 465-B Peachtree Drive, Mountain View, Calif. 94043.

## MAG SOFTWARE, INC.

Mag/Basic format

Mag Software, Inc. has announced that Mag/Basic, its family of data base management systems, is available in 14 new formats.

Some of the formats include the Altos Computer Systems, Inc. Altos 586; Eagle Computer, Inc. Eagle II and Eagle 1000; Hewlett-Packard Co. HP 87/125; Kaypro Computer Corp. Kaypro II; NCR Corp. 1st Step and Decision Mate; Osborne Computer Corp. Osborne DD; Sanyo Business Systems Corp. Sanyo 2000; Televideo, Inc. Televideo 902 and 1000; Toshiba Corp. T100; and Xerox Corp. 820.

All packages are available in IBM's PC-DOS, Microsoft, Inc.'s MS-DOS, and Digital Research, Inc.'s CP/M 80, CP/M 86, Concurrent CP/M 86 and MP/M 86. Prices are \$295, \$495 and \$795 for Mag/Basic, Mag/Basic+ and Mag/Basic+, respectively. Upgrades from Mag/Basic to Mag/Basic+ are \$200 and from Mag/Basic+ to Mag/Basic+, \$300.

Mag Software, Suite 305, 21054 Sherman Way, Canoga Park, Calif. 91305.

## MONSIEUR SOFTWARE, INC.

Softplot/BGL enhancement

Monsieur Software, Inc. has released an enhanced version of Softplot/BGL, a device-independent graphics extension system that is said to allow users to create custom graphics applications in Basic.

According to Monsieur, Softplot provides two-dimensional viewing with windows, three-dimensional plotting, dashed and colored lines, image rotation and automatic text justification.

Another feature, Emuplot, is a general-purpose plotter emulator for dot matrix printers that reportedly can produce high-resolution graphics. The package requires 64K bytes of memory and supports a variety of Digital Research, Inc. CP/M and Microsoft, Inc. MS-DOS systems with Microsoft's M-Basic. Programs may be transported from one CP/M or MS-DOS system to another without being rewritten, the company noted.

Softplot/BGL retails for \$99. Monsieur Software, 1972 Massachusetts Ave., Cambridge, Mass. 02140.

## DIRECT-AID, INC.

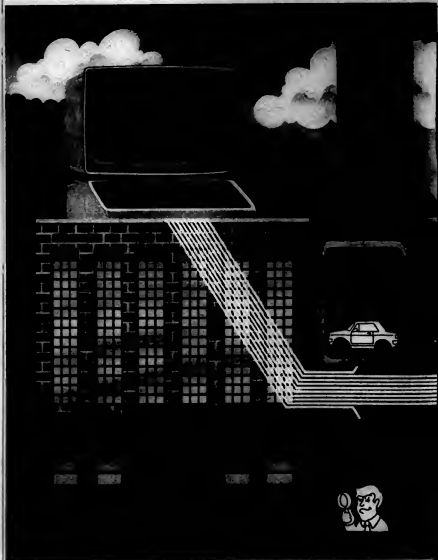
Impersonator

Direct-Aid, Inc. has announced the Impersonator, a communications package that allows IBM Personal Computers to emulate any asynchronous terminal.

The program reportedly emulates Lear-Siegler, Inc. ADM-3A, Digital Equipment Corp. VT-43 and VT100, Baseline Corp. Exprit, IBM 3101, Data General Corp. D810 and Televideo Systems, Inc. 912 terminals.

The Impersonator costs \$195. Direct-Aid, P.O. Box 4436, Boulder, Colo. 80506.

See SOFTWARE page 95



## MICROCOMPUTERS

## SOFTWARE from page 84

GMS COMPUTER SYSTEMS  
Infograph 100

GMS Computer Systems has announced Infograph 100, a graphics package for Digital Equipment Corp.'s Rainbow microcomputer.

The menu-driven program features decision rules that help the first-time user develop graphs and charts, the vendor said. Infograph 100 produces line, horizontal and bar charts. The program reportedly reads Software Arts, Inc. DIF files and uses the Rainbow's bit-mapped display.

The program costs \$266. GMS Software, 112 E. Soverano Way, Carson, Calif. 90745.

## IBM from page 83

ble, Md. "But its microcomputer is an average product. Some data processing managers may look for a better technical product or a lower price, so they turn to a compatible vendor."

Limited availability of IBM Personal Computers, not price or technical features, slowed Compaq to flourish, some analysts maintained.

"IBM managers wanted to buy an IBM Personal Computer," said Kate Cogswell-Carr, consultant at The Yankee Group in Boston. "IBM had trouble meeting demand for its microcomputers. Given the option of waiting for an IBM microcomputer or immediately receiving a Compaq, many data processing managers chose to buy the compatible."

A data processing manager dis-

agreed with Cogswell-Carr's assessment. "We bought Compaq because it was a portable microcomputer that ran software for the IBM microcomputer," said Gary Schuch, senior consultant at Filmer, Inc. in New York. "IBM did not have a portable microcomputer."

## IBM portable entry

Will IBM's recent entry into the portable market affect Compaq? "In the next six months, IBM will not ship enough portables to impact Compaq's sales," Kline said. "Each retailer is limited to five IBM portables per month. With 1,400 retailers, IBM will only ship approximately 7,000 microcomputers a month," he added.

Compaq will face increased competition from other compatible man-

ufacturers as well as from IBM. "Last year, there were 16 manufacturers claiming some level of IBM compatibility," Kline said. "This year, there are 44 companies making that claim."

As competition increases, compatible manufacturers are attempting to increase corporate market penetration.

"Selling to corporate accounts will be an important [part], but not the major part of our growth," White said.

Compaq is increasing its support to its dealers. "We have a just-in-time number dedicated to retailers selling to corporate accounts," Price said.

What will the future hold for compatible manufacturers? "Frankly, once IBM's production is in full gear, I don't think that many compatible manufacturers will remain in business," the retailer said.

## PROTECT from page 88

packages to be copied, plus it puts the developer in the awkward position of prosecuting his own customers. Also, it's hard to find the copies to begin with, and serialisation is a relatively expensive procedure.

Signature techniques are software or hardware devices that are checked by the system in order to allow access. The most often tried techniques are simple code signatures that must be entered from the keyboard to allow the package to run. These, however, can be easily distributed by the buyer to someone who has been allowed to copy them, and who in turn doesn't have to worry about protecting them from unscrupulous customers.

The best potential protection devices are hardware signatures. These "black boxes," which plug into the computer, are individual to each buyer, but are controlled by the software supplier. Thus, there is no danger of the software being copied since it will not operate without the coded "key," and this key cannot be easily reproduced. At the same time, unlike copy-proof systems, the software can be copied by the authorized buyer.

Hardware signatures, too, have limitations. They have to be manufactured, which adds to the cost of the software. There are also costs involved in keeping records. As a result, such devices are unlikely to be used for the protection of very low-cost programs. While simple, these devices still must be connected to the computer, which contributes some small additional complexity to the system. Though highly reliable, any hardware device can fail.

These problems, however, look very small when compared with the far more insurmountable drawbacks of other methods. Hardware signature devices offer the software developer sure protection for a small cost, and currently, that's way ahead of whatever is in second place.

Hurst is senior member of the technical staff at Point 4 Data Corp. in Irvine, Calif.





# COMPUTER INDUSTRY



**INDUSTRY INSIGHT**  
Peter Bartlett  
On IBM's future

## IBM lukewarm on local-area nets

For a company believed to be bringing out imminently the local-area network, IBM seems remarkably cool to the utility of such technology.

Talking to stock analysts recently at the company's Entry Systems Division in Florida, IBM President John F. Akers sounded very ho-hum about the issue. He seemed to be saying that while IBM will be bringing out a local-area network it can be proud of, the company doesn't expect it to be any type of revenue leader.

Akers said it is "arguable" how much revenue will be generated by local-area networks. He did say, however, that there is a definite need in business for some method of workstation communications and file transfer on a cost-effective basis.

Make no mistake, IBM is bringing out a local-area network at some point. Akers said the company takes the need seriously and is "spending our fair share of research and development on it."

At one point, he said IBM is spending "a lot" and that company engineers have assured him the product will be based on fine technology and be "as cost-effective as anything on the market."

But for a company that daily proclaims its goal of being the low-cost provider, that hardly sounded like a blanket endorsement and certainly would seem not to herald anything incredible. Akers said he expects local-area network products to come in "many flavors," which causes one to surmise that IBM does not have a product that is going to shake up the industry.

The only point at which Akers came anywhere near to being excited about local-area network technology was when a stock analyst asked why the main-

See IBM page 100

## Akers notes Fujitsu's 'window' Says Big Blue's efforts won't 'let up for a minute'

By Peter Bartlett  
On IBM

BOCA RATON, Fla. — Fujitsu Ltd.'s increased ownership of Amdehl Corp. has given the Japanese an important window to the U.S. market, IBM's president told a large group of stock analysts recently.

Speaking at IBM's Entry Systems Division headquarters here recently during a day-long briefing for the New York Society of Stock Analysts, John F. Akers — elevated a year and a month ago from senior vice-president to president — delivered a harsh assessment of the Amdehl-Fujitsu relationship and also declared IBM's intent not to let up in its drive for preeminence in the information processing industry.

Asked if the recent move by Fujitsu to boost its share in Amdehl to 49.5% was a defensive measure or represents a threat to IBM, Akers replied, "I think Amdehl has

been a conduit for Fujitsu from the very beginning. I think this has given the Japanese manufacturer a very important window into the U.S."

Fujitsu's recent stock acquisition, according to Akers, "indicated [Fujitsu] thinks its participation will grow. I expect its product line will expand."

In their efforts to expand in international markets, the Japanese "have accommodated too many different relationships around the world," Akers said. Japanese manufacturers are strong competitors, he added, and at IBM "we take them seriously."

Reviewing IBM's success over the past two years — in terms of new product acceptance and healthy revenues and profits — Akers declared IBM will not become complacent because of that success. "We do not intend to let up for one minute," he said.

See AKERS page 107

## IBM to saturate workstation mart

By Robert Reid  
On Your Cost Issues

DALLAS — IBM intends to saturate a \$5 billion workstation marketplace from high end to low end through aggressive product pricing, with the goal of controlling access to users' host computers, the Association of Data Processing Service Or-

ganizations (Adapco) was told here last week.

Speaking at Adapco's 80th Management Conference, Scott Smith, a financial analyst at The Gartner Group, a Stamford, Conn.-based research firm, said IBM will compete against hardware vendors rather

See STRATEGY page 108

## U.S. crimps DEC's export privileges

MAYNARD, Mass. — Digital Equipment Corp.'s export privileges have been limited by the U.S. government, reportedly because one of the company's superminicomputers was seized on a ship bound for the Soviet Union last year.

Company officials reported last week

that the U.S. Department of Commerce, in a surprise move, placed major restrictions on DEC's shipments of computers to West Germany, Norway and Austria, three countries the government considers prime diversion points to the Soviet Union.

See IBM page 108

## Cullinet

Software, Inc. has purchased an IDMS-based payroll/personnel system from Information Science, Inc./103

### INSIDE

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■ Automatic will rewrite recent financial results and expects to report a loss; the company also fired a manager in Paris for falsifying sales records/100

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# A Way to Keep Computers on the Right Track

## COMPUTER INDUSTRY

# Japan execs deny DP success, urge U.S. cooperation

By Robert West,  
OF West Coast Bureau

**SAN FRANCISCO** — The image of Japan as an all-powerful economic and technological juggernaut was dented by some of its own industrialists here at a two-day conference jointly sponsored by the Japan External

Trade Organization and The Conference Board, Inc.

Titled "Japan and U.S.: Cooperating in High Tech," the conference brought together representatives from government, industry and academia of both countries.

Koji Kobayashi, chairman of Japanese computer maker

Nippon Electric Co. Ltd., said Japan's success in the data processing and electronics fields is superficial when compared with the deep roots of science and technology in the U.S.

However, he said, "although the foundations of Japanese science and technology are still weak, Japan has to have self-awareness and responsibility as an economic power and meet the challenge of high-technology development. She has to step forward vigorously on the road to healthy competition and cooperation as a trusted partner of the United States."

In order to facilitate this at the stage of basic research, information should be widely disclosed, Kobayashi said. As the new technology approaches the stage of practical use, all parties should cooperate actively with each other and make efforts to improve production techniques

and explore markets.

Another effective means of technology transfer, he asserted, is to set up plants in one another's country and to manufacture products locally. However, he warned, for this to continue, the taxation system in both countries must be fair, and he lashed out at the utility tax enforced by some U.S. states, requiring overseas investors to pay state tax on their profits earned worldwide.

"We are strongly opposed to the utility tax, and we sincerely hope that it will soon be abolished," he declared.

The conventional wisdom that Japan is a high-technology giant backed with millions of dollars from its own government was attacked by another Japanese speaker — Seiichi Ishikawa, adviser to the Nomura Research Institute.

Ishikawa said the Japanese government's share of expenditure on research and development is extremely small; of \$17.3 billion spent on industrial R&D in 1981, only 37% of that amount involved public money, he said.

Shoerwood Pavvett, chairman of the Battelle Memorial Institute, specialists in joint high-technology research projects, said Japan is more willing than the U.S. to fund research over the long haul.

"On acceptance of proposals and the funding of research programs, the Japanese have been more precise than Americans to fund research and development over the last 10 years. Their requirements are better organized for the long haul and in major targeted areas. They are willing to fund high-risk, longer term things than we are," Pavvett said.

However, Pavvett continued, there are weaknesses in the Japanese approach.

"When you look at some of the literature coming out of the Japanese universities, some of the fundamental work is very impressive, but the more practical scaled work is not as impressive. We have also noticed in our work with the Japanese that everyone is careful not to stand out to be different. This attitude tends to stifle creativity and innovation," he charged.

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PORT LAUDERDALE, Fla.  
— Modular Computer Sys-

tems, Inc. (Modcomp) recently announced a net loss of \$2.5 million, or \$4.43 per share, for the year ended Dec. 31, 1983, as revenue declined \$17.8 million from the previous year.

Sales in 1983 amounted to only \$74.9 million, compared to \$92.7 million in 1982, when a profit of \$1.7 million, or 34 cents per share, was reported.

For the fourth quarter of 1983, the company experienced a loss of \$10.9 million, or \$2.06 per share, with sales of \$18.1 million, an 18% decline from the corresponding period a year earlier.

Gabriel A. Rosica, president and chief executive officer of Modcomp, said that 54% of the loss was attributed to the production, marketing and subsequent discontinuance of the Zorba

portable microcomputer, acquired in June of last year and discontinued in February 1984. Another factor contributing to the loss was a decline in minicomputer sales volume, Rosica said.

The company attributed the minicomputer sales decline to the effects of the recession on Modcomp's industrial customers and the lack of significant new products.

The company reduced its work force by 14% in September and consolidated offices and factory space to reduce leasing expenses, Rosica said.

The company announced two products late last year: Rosica said the Classic II/16 single-board microcomputer began shipping on Jan. 31, and the Classic 52/88 is planned for shipments in the fourth quarter.

## Austin directory available

AUSTIN, Texas — A directory of businesses involved in the Austin area's growing computer industry has been announced here. The directory lists local computer stores and dealers, software publishers, programmers, repair centers and educational centers.

The first edition of the di-

rectory was produced in November 1983. It reportedly will be updated quarterly. Listings are alphabetically indexed and cross-indexed by Zip Code.

The directory is available for \$4.95 per copy from The Computer Task Force, P. O. Box 275, Cedar Park, Texas 78613.



## COMPUTER INDUSTRY

## Tech innovation seen key in race for global market shares

### As well as an impetus for cooperation between U.S., Japan

By Robert West

CP West Coast Bureau

**SAN FRANCISCO** — Companies that have done the best job of combining ideas, resources and people are likely to be the winners in the international high-technology arena, according to speakers at a conference here recently for U.S. and Japanese executives.

Takao Kondo, president of Mitsubishi International Corp., was one of the speakers at the conference on "Japan and U.S.: Cooperating in High Tech" sponsored by the Japan External Trade Organization and The Conference Board, Inc. He said the development of technology requires an international perspective.

"Matching innovation to the need for innovation, assessing the impact of new technological breakthroughs and finding commercial applications in new and established industries are, in fact, international issues, and they impact crucially on the competition for global market shares," Kondo said.

The daunting advances in technology in the U.S. and Japan have increased both the opportunities for cooperation between the two countries and the forces that such cooperation may take, according to Kondo.

As examples of this coop-

eration, he cited the formation of a joint venture in Japan between Hitachi Ltd., IBM Japan and a Japanese software-oriented venture firm to develop and market hardware and software. Also, he added, Mitsubishi recently acquired equity in Microware, a Bellevue, Wash.-based software house, and forged a linkup between the U.S. firm and a Japanese software developer, with a view ultimately towards marketing its products in Japan.

"Still another vehicle for cooperation in high tech is the practice of importing equipment under OEM," according to Kondo. "For example, an advanced office automation system developed by an American manufacturer might be enhanced by a piece of equipment that could be better produced in Japan or elsewhere. As the newly industrialized countries become more technologically advanced, we should see more such arrangements on a multinational scale."

Erich Bloch, vice-president of corporate technical personnel development at IBM, stressed the value of co-

operative research between the two countries.

Cooperation, he contended, will not stifle competition, but rather will promote it by bolstering the fabric of high-technology industries. "Those who can translate research into products quickly and effectively will reap the benefits of cooperative research," he said.

Bloch, who is also chairman of Semiconductor Research Corp., warned his audience that the U.S. is being outpaced by Japan in semiconductor. "Our research and development in the U.S. is much more dependent than it is among our trading partners. In Japan and Europe, R&D is much more focused in areas such as computers and semiconductors."

Bloch said there needs to be an even-handed approach toward cooperative research, and he warned that the controversy now raging over Japan's proposals to change its software copyright laws (CW, March 19) is an example of something that could "throw cooperative research under a cloud."

The economic controversies between the two countries were also noted by another speaker — Tadashi Susaki, senior executive vice-president at Sharp Corp. Japanese and U.S. talent complement one another, he

maintained, and it should be easy for the two countries to work together to improve their collective performance.

"However, there are numerous political and economic obstacles which will be overcome only by great ef-

fort. In particular, our governments must adhere to the principle of free trade, and we must continue to hold high-level meetings across a broad spectrum of issues if we are to bridge our differences," he concluded.

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## Victor weighing proposal

By Patricia Keady

CP Staff

**SCOTT VALLEY, Calif.** — Having decided to sell "substantially all" of the assets of its computer business, Victor Technologies, Inc. is considering a proposal for its business distributor to acquire worldwide manufacturing rights to Victor computer products.

The financially troubled Victor recently became the third micro maker in a six-month period to file for protection from its creditors under Chapter 11 of the federal bankruptcy code. Victor's debt is estimated at over \$100 million.

In a letter to the U.S. headquarters of the distributor, Applied Computer Techniques PLC (ACT) of Birmingham, England, Victor's board of directors reportedly indicated that it would consider submitting ACT's proposal for approval by all of the interested parties. Victor also said that proposal had the full support of its creditors committee, which is chaired by attorney Arnold Quintner, according to a

spokesman for ACT (North America), Inc., ACT's U.S. subsidiary. The announcement is said to be the result of five weeks of negotiations.

Over the next few weeks, a detailed agreement is expected to be submitted for final approval to all the parties concerned prior to filing it with the federal Bankruptcy Court, ACT said. Victor's board also authorized its acting chief executive, its consultant and its bankruptcy counsel to clarify outstanding points and conclude negotiations, the spokesman said.

ACT's proposal would enable it to secure worldwide distribution rights, excluding the Americas. The assets to be acquired under the proposed agreement would consist primarily of stock and receivables.

In other business concerning Victor, Lotus Development Corp. last week announced it has discontinued its version of 1-2-3 for the Victor 9000. However, it will continue to fully service and support all Victor 9000 users who have purchased 1-2-3, a spokesman said.

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## COMPUTER INDUSTRY

# IBM boosts micro production, still lags behind demand

By Peter Bartel  
CW Staff

ROCA RATON, Fla. — IBM will exceed its personal computer production goals this year and still not catch up to demand, according to Philip D. Estridge, president of IBM's Entry Systems Division.

The company will more than triple production of the personal computer line of products — ramping up U.S. production from a rate of one unit coming off the assembly lines every 16 seconds to one unit every seven seconds, Estridge told almost 300 stock analysts gathered here re-

cently.

Industry analysts had already expected IBM to ship two million units this year, and Estridge's comments seem to indicate an even greater volume. He also said IBM early in March began offering an IBM credit card for use at its retail product centers.

The all-day session at the Entry Systems Division headquarters and nearby production facilities was arranged for the New York Society of Stock Analysts and featured a tour of the Personal Computer and Personal Computer XT production lines that will be increasingly automated by this summer.

Estridge said IBM will spend \$600 million this year on expansion of the Entry Systems Division, equally divided among facilities for existing products, facilities for new products and new equipment.

Estridge said more Personal Computers were shipped for use within IBM divisions

this year than were distributed for sale when it was first introduced in 1982. According to Allen Krowe, chief financial officer and senior vice-president of IBM, some 22,000 Personal Computers are presently in use in IBM divisions, and that figure should increase to 60,000 by the end of 1984. Krowe said IBM is confident Personal Computers will increase demand for large processors, because a majority of internally used micros are tied into large processors.

Estridge said he doesn't think the demand curve has even begun to appear at this point and noted that as each new Personal Computer product is introduced by IBM, demand soars. With the Personal Computer products, he said, "We're really doing old jobs today with those machines; the new jobs are just starting to emerge."

But while the Personal Computer and Personal Computer XT products can't keep up with demand, production

of the recently introduced PCjr is already close to catching up with demand, Estridge said, adding to speculation that the PCjr is not doing well in the market.

IBM, however, believes the low-end Personal Computer product — actually made under contract by Tele-Data Corp. in Tennessee — is "uniquely" suited for home, school and work-at-home applications, Estridge said.

Pointing to the wide array of third-party, add-on products available for the other Personal Computer products, Estridge said it is possible consumers at some point could enhance the PCjr to the level of the basic Personal Computer, but at a lower cost.

Commenting on IBM's strategy of establishing third-party distribution channels and relying on third-party components, Estridge said the job is too much for IBM. "Not only do we not have enough resources, we don't know how," he said.

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## IBM granted motion against Cybernex

SAN JOSE, Calif. — IBM recently was granted a motion in federal court for an injunction prohibiting Cybernex Ltd. from using alleged IBM trade secrets in the man-

ufacture of this-film recording heads.

Cybernex, which is headquartered here, immediately issued a statement maintaining the "relative handful" of products that are covered by the injunction will not materially affect the company's ability to manufacture thin-film heads.

According to William Klein, Cybernex's president, the "limited nature" of the injunction, relative to what IBM originally sought, justified the company's belief

that the few similarities between its manufacturing process and that used by IBM "are coincidental — the results of the nature of the product itself and good engineering practice."

Cybernex said it had "opened its doors" to IBM engineers when IBM first expressed concern, and that IBM had heard its court action on the joint efforts examining the Cybernex processes. Cybernex said it didn't think IBM had acted in good faith.

## Rixon, Lotus settle \$10 million lawsuit

CAMBRIDGE, Mass. — Without admitting any wrongdoing, Rixon, Inc. recently agreed to several demands from Lotus Development Corp., thus settling a \$10 million lawsuit that Lotus filed against Rixon two months ago.

Filed in U.S. District Court in Boston Jan. 31, the suit charged Rixon with making unauthorized copies of the Lotus 1-2-3 software program and related documentation and then distributing the copies to Rixon branch offices throughout the country.

Under the terms of the settlement, Rixon consented to the entry of a permanent injunction prohibiting it from

making or using copies of the 1-2-3 program and related materials in the future. In addition, the data communications vendor agreed to pay Lotus an undisclosed amount of money as part of the settlement.

Rixon also agreed to investigate the allegation of copying and to return all its unauthorized copies of 1-2-3 disks and documentation.

Lotus President Mitchell Kapor said Rixon management had cooperated fully in investigating the allegations of copying activity.

The settlement "represents a major step in our effort to eliminate the software piracy problem," according to Kapor.

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## COMPUTER INDUSTRY

# Attention to quality stressed for high-tech executives

By Robert Bost  
Of West Coast Bureau

**LOS ANGELES** — High-technology companies are out of touch with both their own employees and their customers, a management consultant told some 400 high-tech chief executives and senior managers here recently.

Speaking at a conference on managerial excellence presented by the Southern California Technology Executives Network, Thomas Peters, president of the consulting firm Stunk Works, Inc. and coauthor of the book *In Search of Excellence*, said attention to mundane details is the secret to rapid productivity gains.

"The number one managerial shortfall in this country is managers who are out of touch with their own employees and customers. Technology companies are falling flat down when it comes to supplying total customer satisfaction. . . . Quality needs to become the strategic focus of high-tech organizations," he claimed.

The key to the long-term viability of high-technology concerns, Peters added, is not the people in the research and development center, but the person on the production line.

## Sense of trust

Peters said it is essential to instill a sense of trust within a company. "If you insist on treating the people in your organization like children, do not be surprised when they respond that way," he told the executives.

Peters said there is a critical need to build the institutional skills that will lay the foundation for future rapid growth. For this to happen, he warned, a complete shift in the notion of leadership needs to take place.

"The only value of a chief executive is to pay attention to what is important. The leader in an organization should be a coach, a nurturer

and an enthusiast," he stressed.

Also speaking at the conference, Floyd Kvanme, then-executive vice-president at Apple Computer, Inc., emphasized the critical relationship between vendors and management information systems (MIS) departments.

Referring to the dominance of IBM, he said, "It is important to position your competitors accurately. When it comes to large organizations, the prime vendor is not IBM; rather, it is the MIS department. You need, therefore, to be customer-compatible, not IBM-compatible, because you are in business to support your customer, and your customer is not IBM, it is

the MIS department."

Kvanme said the chief executive should consider himself or herself the number one quality officer in the company. "The job of a chief executive is to create and establish the right set of issues for your company. Quality starts in your office, and you must get everyone in your organization to sign up," he added.

Allen Michels, chief executive officer at Convergent Technologies, Inc., stressed the need for risk-taking in establishing a high-technology venture. He said that a corporate leader needs to be willing to risk everything and be accountable for the collective failure of others, should that occur.

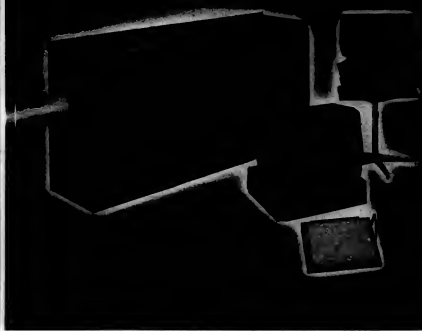
"Set impossible goals," he advised his audience. "If you can manage people effectively in the pursuit of impossible goals, it gives great strength and power to your organization."

Michels said that only by simplifying the communication process in an organization can such goals be achieved, so it is vital to keep a company simple and lean.

"Keep people focused on the goals. Focus on making decisions in key areas such as manufacturing, marketing, research and development and the collective set of managerial objectives and stick to the basics," he added.

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## ITT reports revenues down

**NEW YORK** — ITT Corp. announced recently that revenues were down 4.5% in 1983, compared with 1982, and that earnings were up 1.8% over the year-earlier figures after a restatement of earnings for the first three quarters of 1983 and for earlier periods.

Earnings for the year were \$675 million, or \$4.50 per share, compared to the restated 1982 earnings of \$669 million, or \$4.47 per share, according to ITT.

Prior to the restatement, 1982 earnings had been reported at \$703 million, or \$4.75 per share.

Revenues for 1983 were \$20.2 billion, down from \$21.2 billion in 1982.

For the fourth quarter of 1983, ITT reported earnings of \$278 million, or \$1.88 per share, up 12.5% from the restated earnings for the comparable period in 1982, when earnings were \$245 million, or \$1.65 per share.

Prior to restatement, fourth-quarter 1983 earnings were \$272 million, or \$1.84 per share.

## COMPUTER INDUSTRY

## Akers lauds AT&T expertise at AEA conference

By Peter Bartolli  
CW Staff

BOSTON — IBM may be big, but "the industry dwarts us," company president John P. Akers said here recently in a brief but wide-ranging press conference at which he also acknowledged the technical expertise of potential rival AT&T.

Akers, named president in February 1983, held the press conference after delivering the keynote address to a seminar for industry executives sponsored by the American Electronics Association (AEA) Productivity and Quality Center.

Asked to comment on the impact of the AT&T divestiture on IBM,

Akers said the divested operating companies "are becoming a source of distribution to us, just as they are becoming a source of distribution to other companies." But Akers said he doesn't believe that distribution channel will be major.

With speculation rampant in the industry these days about AT&T's expected move toward becoming a major information processing systems vendor, Akers delivered some unexpected kudos in the direction of the communications giant.

"AT&T has had a history of technology and products that is hard to argue with, and I expect that to continue," he said. "Unix is probably the

most successful product for AT&T so far," Akers said, adding that he expects AT&T to deliver more products to the market.

When he was asked what IBM considers to be its major competition, Akers protested that "the industry is a very big industry... probably five times, six times IBM's size — the industry dwarfs us."

During his keynote address at the AEA seminar on "Productivity and Quality According to IBM and Hewlett-Packard," Akers said that four years ago the company found there was room for improvement in the quality of its products and took steps to focus quality improvement on the

process of development and production.

He said the industry has a leadership challenge every day, but also has leadership responsibility. "The quality more and more demands quality in our products. ... If we don't respond and respond well, society, it seems to me, will help us respond."

When it began its quality improvement project, IBM discovered it was "too often fixing quality problems in our customers' offices at great expense to us and to them."

The company also realized, according to Akers, that it had become "too tolerant of defect levels," ramping up production levels to offset an expected number of defects and requiring its suppliers to deliver supplies at 95% defect-free levels, instead of seeking totally defect-free supplies.

### Five tenets

Akers said IBM evolved its quality improvement plan around five tenets: management action and involvement, employee participation, focus on the job process, "no level of defect is acceptable," and quality improvement reduces total costs.

While nonacceptance of defects "certainly required within IBM a change in attitude," Akers pointed out that the company's "profit growth exceeded revenue growth at an increasing rate, and we knew quality growth had something to do with that."

IBM implemented a product policy requiring the quality and reliability of new products at the time of general availability to be superior or at least as good as anything else on the market, Akers said. Releasing one processor, he said, required "four tries" before the repair action rate was lower than the older product it was replacing.

# REVOLUTION

## NIC OFFICE BY DATAPOINT



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## Cullinet to buy Insci system

WESTWOOD, Mass. — Cullinet Software, Inc. mid last week it has an agreement in principle with Information Science, Inc. (Insci) to acquire rights to Insci's IDMS-based Payroll/Personnel System.

The agreement, according to a Cullinet spokesman, provides for Cullinet to pay approximately \$6 million plus royalties to Insci over a seven-year period for the system, related technology and Insci's IDMS current and prospective customer base. Insci's existing IDMS Payroll/Personnel accounts will be transferred to Cullinet for a \$2.5 million payment.

Robert N. Goldmann, president of Cullinet, said, "The addition of payroll and personnel software to our existing line will not only add important applications, but will also ensure the integration of these systems with our manufacturing and financial applications software."

Jody Dyer, president of Insci, said, "By transferring this product to Cullinet... Insci will be better positioned to continue to deliver outstanding products for other operating environments."

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## COMPUTER INDUSTRY

# Boom times predicted for artificial vision industry



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Artificial vision consists of electro-optical systems that act as sensors and interpreters that can automatically identify specific patterns and trigger appropriate actions of associated mechanisms or systems. No self-respecting robot can call itself "intelligent" anymore if it does not have a vision system that guides it to perform specific tasks in response to known but randomly occurring external factors.

Studies show that human beings acquire 88% of their knowledge through sight, 11% through hearing and the rest through the other senses. Since the world is built around us and for us, robots that can act like us can probably serve us best. This suggests that we must give them the best vision we can afford.

Artificial vision is not just a TV camera strapped to a mechanical arm that records images on tape. The system must be able to digitize the image instantaneously, compare it with specific patterns stored in its memory and decide whether it "sees" what it is supposed to see before it acts. Vision is important in automation and will become even more so as the factories of the future develop into flexible manufacturing centers.

Vision systems that depend on specialized software and are based on general-purpose computers can be made very flexible, but may also be too slow and cumbersome for many practical applications. New developments in very large-scale integration, microchip customization services and the use of laser beams open up new vistas for tailor-made embedded vision systems that are very fast, highly specialized and also cost-effective.

All these developments, on the eve of an expected robotics explosion during the mid-1990s, suggest boom times ahead for the fledgling artificial vision industry. The market is but a few years old and was estimated at only \$40 million in 1983, but is expected to double during 1984.

Actually, robotic guidance accounts for only 20% of artificial vision consumption today. Straightforward inspection and measurement applications on the production line each claim 40%. But observers are confident that robots will become the largest consumers of artificial eyeballs in the very near future.

Applied Intelligent Systems is one new firm in this business which manufactures an artificial vision system that can inspect 10 integrated circuit microchips every second with 100% accuracy. This is the type of application with the greatest future, particularly as integrated circuits and assemblies become more complex. Electronic assembly automation, where numerous components must be identified, inspected, placed and re-inspected several times, is an area ripe for artificial vision applications in the form of intelligent robots or specialized vision systems.

Other new firms that target electronics assembly include Machine Vision International, Control Automation and Intellex, which manufactures specialized robots with vision

for handling silicon wafers and magnetic disk reading head assembly.

Integrated Automation is another start-up that is manufacturing robotic systems based on artificial vision concepts for factory automation. In late 1983, the company registered 2,350,000 shares of stock for sale to the public at a later date.

Several companies involved in artificial intelligence are also participating in the mechanical vision boom, because artificial intelligence methods are used in the pattern recognition software of artificial vision systems. Most prominent of these are Cognex, which makes devices for automatic reading and verification of

labels; Machine Intelligence, a Stanford Research Institute spin-off that produces vision interpretation systems; and Octek, which is designing vision systems for computerized applications.

There are also a host of smaller firms — such as Diffracto, Electro-Optics Controls, Perception, Synthetic Vision Systems, View Engineering, and Vision Peripherals — that are providing a variety of products ranging from car door assembly inspection systems in automobile plants to just plain and simple consulting on artificial vision use.

Not to be forgotten are the companies that rely on vision for their

products. These include such better known names as Automagix, Inc., Robotic Vision Systems and Object Recognition Systems, which specializes in automatic bin picking systems for robots.

Last but not least are the subsidiaries or divisions of large corporations such as Automatic Inspection Division, owned by Orono-Illinois; General Electric Optoelectronic Systems; and Illbruck. Most other robot manufacturers are clearly developing into a new market for artificial vision suppliers, but if the field becomes too crowded, they may well continue to acquire and merge these operations into their own.

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## COMPUTER INDUSTRY



## EXECUTIVE COMMENT

The Professional Services Management Association (PSMA), an organization of professional service firm executives, has appointed Donna Tobin as its first executive director.

In conjunction with this appointment, PSMA has established new offices at 1215 Prince St., Alexandria, Va. 22314.

Donna Tobin has been named president of Xerox Corp.

Thomas L. Cunn has been elected vice-president, legal affairs, and secretary and Lawrence W. McGraw

has been elected vice-president, marketing and service support, at Tandem Computers, Inc.

Douglas N. MacDonald has been appointed vice-president/general manager at Computer Storage Technology, Inc.

Donald E. Kleissel has been named vice-president, strategic marketing, at Reference Technology, Inc.

William S. Martin has been named vice-president, planning and business development, for GTE Communications Systems.

Michael P. May, executive vice-president, treasurer and director of Applied Communications, Inc., has been assigned additional responsibilities

as chief operating officer.

Gary Margenthaler has been promoted to president of Relational Technology, Inc.

Digital Equipment Corp. has promoted three senior managers to vice-president. They are Ross Ann Olesch, large systems marketing; Robert C. Hughes, business and systems marketing; and John L. Sims, business and office systems marketing.

Richard B. Gordilader has been named president and chief executive officer of Vault Corp.

Michael Kampf has been promoted to vice-president of supervisory controls systems and Gary Peller

has been named vice-president of operations at Ayrda Corp.'s Computer Systems Division.

David A. Campbell has been named chairman of the board of Computer Task Group, Inc. John P. Courtney has succeeded Campbell as president and chief operating officer.

Sanders Associates, Inc. has announced the following appointments: Edward A. Miller, executive vice-president; James F. Woolenough, president, Federal Systems Group, and senior vice-president; Richard A. Reed, executive vice-president, Federal Systems Group; and Jerry G. Bender, senior vice-president, Electronic Warfare Division.

Don E. Wright has joined Egan Systems, Inc. as vice-president, applications software development.

Wayne Harvey has joined Oracle Corp. as director, corporate technical services.

Leslie A. Kaplan has been named vice-president of human resources and Lloyd Morgan has been appointed vice-president of manufacturing at North Star Computers, Inc.

## Compaq to cut micro prices

HOUSTON — In the wake of IBM's introduction of its Portable Personal Computer, Compaq Computer Corp. last week acknowledged plans to cut prices for its floppy disk-based portable micros.

A Compaq spokesman declined to discuss the size or the timing of the cuts. However, many dealers have slashed prices of the basic single-drive Compaq system from \$2,995 to \$2,495 and dropped prices for the basic dual-drive system from \$3,495 to \$2,995. The suggested price for the Compaq Plus, the vendor's hard disk portable system, is expected to remain stable at \$4,995.

IBM introduced its portable micro in February with a suggested price of \$2,795. It has not announced any plans for a hard disk version.

## Kvamme joins venture firm

SAN FRANCISCO — E. Floyd Kvamme resigned recently from Apple Computer, Inc., where he had been executive vice-president of marketing, and subsequently joined Kleiner, Perkins, Caufield & Byers here as a general partner.

Formerly president of National Advanced Systems, Inc., Kvamme joined Apple in January 1983 and was responsible for worldwide marketing, sales, distribution and support of Apple's products.

Kleiner, Perkins, Caufield & Byers is a venture capital firm that specializes in high-tech firms. The firm has financed 65 companies, including Tandem Computers, Inc., Lotus Development Corp. and Compaq Computer Corp.

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## COMPUTER INDUSTRY



## SUPERSTUDIES

Venture Graphics, Inc. has secured additional financing of \$3,789,000 through a private placement of common stock at \$1.50/share. The funds reportedly will be used to address working capital requirements.

Bonnywell, Inc. and Permutec Technologies, Inc. (Permutec) have signed a third-party service agreement. The contract calls for Bonnywell's Customer Service Division to be the national service vendor for Permutec's computer-aided design workstations.

Lotus Development Corp. announced it is developing a Radio Shack TRS-80 Model 2000 version of its 1-3-3 integrated program, to be sold through Radio Shack Computer Centers. Shipments of this version of 1-3-3 will begin at midyear.

Data General Corp. and AT&T Information Systems, Inc. announced an agreement to develop a communications interface to enable DGI's Comprehensive Electronic Office workstations and Desktop Generation systems to connect with Bellco's MV Family systems through AT&T's Digital Multiplexer Interface Dimension System 85.

Agris Advanced Systems Corp. acquired North American marketing rights to the multiuser microproces-

sor-based storage systems developed by Ranset Computer Systems, Inc. The agreement also gives Agris non-exclusive marketing rights for these systems throughout Central and South America as well as Europe.

Data General Corp. has formed a full-service marketing unit, which will focus on marketing peripheral equipment, software, firmware, low-end workstations, system upgrades and spare parts.

Digigraphic Systems Corp. has acquired the product, marketing and manufacturing rights, as well as the customer base, of Magna Technologies, Inc. Terms of the agreement were not disclosed.

Computer Technology Inter-

national (CTI) has signed a letter of intent with Datal Systems Corp. to provide management services for the New York City firm. The agreement will also provide CTI with an option to purchase controlling interest in Datal.

Digital Equipment Corp. and Dect Corp. reached an agreement to enable Decimate II users to mail test-answers and large organizations to add a high-accuracy optical character recognition capability to their offices. As part of Digital's agreement, Dect is also offering a format processor.

The Quarter-Inch Cartridge Drive Compatibility working group reached an agreement to develop proposed standards for the 1008-byte

tape cartridge streamers at its next meeting on April 5-6.

ComputerVision Corp. and Prime Computer, Inc. announced an agreement under which Prime will purchase joint ownership of Revision 4 of the Modbus software package from ComputerVision. Both companies will be able to market Modbus worldwide as of June 1.

Gemstar Corp. and Gather Computer Corp. have agreed to market jointly an integrated line of executive workstation software products. Designed to provide rapid access to diverse business information, the product line runs on off-site hardware manufactured by Convergent Technologies, Inc.

See MWPM page 108

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## AKERS from page 97

sor.

Noting that IBM has grown at a faster rate than the industry overall for the past two years, Akers said, "I think the strategies that are the IBM strategies are working, and they are working well and continuing to pay off for our stockholders."

Akers cautioned against "Personal Computer myopia," noting that while the Personal Computer line of products has enjoyed great success, it is "still a relatively small, but fast-growing, part of IBM."

IBM's continued success depends on many business areas and industry segments, he said. "We fully expect large processors, storage devices, other workstations and office systems, telecommunications products, peripherals and software to carry their fair share of IBM growth," he added.

Software sales growth, according to Akers, will considerably outpace hardware sales growth over the long term. While software only accounted for 6% of total revenues in 1983, over a five-year period it has achieved a compound growth rate of 42%, he said.

IBM set very high goals for this year, according to Akers, and so far this year, the company is ahead of those goals. "We have been pretty busy so far this year, and we will continue to be very busy with new products throughout the rest of 1984," he said.

## COMPUTER INDUSTRY

## SUPER from page 107

Old Standalone, Inc. announced the opening of its first design automation center in the U.S. The new design center is reducing turnaround time and costs.

The U.S. Bankruptcy Court has set April 11 for a confirmation hearing on the plan of reorganization filed by Threshold Technology, Inc., which has been operating under Chapter 11 since November 1982. The plan of reorganization includes an agreement with Siemens Capital Corp. for settlement of its claims, which represent 72% of Threshold's pre-Chapter 11 debt. Pending confirmation of the plan, company officials said that Threshold will seek funds from private and public sources.

## DEC from page 97

Those restrictions, effective Feb. 28, resulted in the removal of DEC's bulk export license for only two months, rather than two years, and the requirement that DEC obtain individual export licenses before shipping computer equipment to the three named European nations.

A Commerce Department spokesman declined comment on the court, noting that "all information regarding a company and the Export Act is considered confidential."

DEC reportedly is the only company currently operating under the restrictions, although industry observers noted that several major companies are due for license renewals in the coming months.

DEC spokesman Richard Barabe said that the Commerce Department may have taken its action because the November seizure of VAX-11 equipment in West Germany and Sweden occurred while the government was — and still is — considering tighter high-tech export controls.

The equipment confiscated in Europe included a VAX-11/780 dual processor that the government considers valuable for military applications and allegedly was intended for shipment to the Soviet Union. The equipment was returned to the U.S. and was impounded by the U.S. Customs Service.

The restrictions, according to Barabe, also call for DEC to provide the government with details about all of its overseas customers for the VAX-11 family, including information about how those customers plan to use the equipment.

Barabe said there is no reason to believe the restrictions will affect the company's earnings, and that, while the Commerce Department has sent some license applications back to DEC for further information, no licenses have been denied. He said the license process has taken about a week.

The company reportedly was surprised by the Commerce Department's actions because DEC has cooperated with federal agents in the November seizure. Published reports have suggested that the Commerce Department may have used against DEC some of the information the company had provided the department during the firm's cooperative efforts.

But Barabe noted, "We want to continue to cooperate with Commerce because better export controls are in everyone's best interest."

Unidata Systems, Inc. announced that, effective March 8, Unidata will change its corporate name to Systems Assurance Corp. The company's Nasdaq trading symbol (formerly Udat) will become Sysa.

Emulex Corp. announced an agreement to open a plant for the design, development, manufacture and marketing of computer peripherals in Coolock, Ireland, this fall.

Stimacorp Corp. announced the formation of Pedologic, its new corporate data processing training division. Pedologic will offer major corporations a full range of individually designed programmer, analyst and management courses.

Computer Consoles, Inc. (CCI)

announced a distribution agreement with Standard Telephone & Cables Ltd. for CCI's office automation systems. The agreement is for \$6 million over the next 18 months. Total value of the agreement, pending all options over a four-year period, is in excess of \$45 million.

Storage Technology Corp. has chosen StorageTek as its new trademark, which will gradually replace STC. The company name, however, will not change.

Universal Supply, Inc. announced confirmation of its Chapter 11 plan of reorganization on March 1. The Canadian Commercial Bank agreed to provide the company with a new line of credit, enabling the company to resume normal operations. The new

board of directors includes William M. Crilly, president; Douglas J. Lehmann, vice-president of finance and administration; James M. Allen; Roy Queen of General Instrument Corp.; an unnamed representative of Canadian Commercial Bank; and a sixth board position to be shared by Paul C. Jala, vice-president of market and product development, and Arvid E. Pabel, the original founder of the company.

Tymshare, Inc. has combined its Transaction Services Division and Telecheck Services, Inc. Division to form the Tymshare Payment Service (TPMS) organization. Jeffrey Reer, previously manager of Telecheck, has become a Tymshare vice-president and general manager of TPMS.

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For example, to select the software you want to use, just touch the screen. So whether you want to work with words, numbers or graphics, all you have to do to get started, is touch the screen. And once you get going, you can change a number in a spreadsheet, or make a chart for a presentation just by touching the screen.

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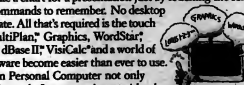
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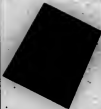
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EDUCATION DEGREE(S) \_\_\_\_\_ YEAR(S) \_\_\_\_\_ MAJOR(S) \_\_\_\_\_ SCHOOL(S) \_\_\_\_\_

PRIMARY OCCUPATION: (For example, Finance, Engineering, etc.) \_\_\_\_\_ NUMBER OF YEARS \_\_\_\_\_

CURRENT JOB TITLE \_\_\_\_\_ CURRENT INDUSTRY \_\_\_\_\_

CURRENT JOB RESPONSIBILITIES \_\_\_\_\_

SPECIAL SKILLS (For example, Foreign Language, CPA, Fortran, S.E.C., etc.) \_\_\_\_\_

GENERAL DESCRIPTION OF CURRENT EMPLOYER (For example, Major Manufacturer, Small Engineering Firm, etc.) \_\_\_\_\_

PREVIOUS EMPLOYER: (1) Company Name \_\_\_\_\_ DATE (Month & Year) From \_\_\_\_\_ To \_\_\_\_\_

PREVIOUS JOB TITLE/RESPONSIBILITIES \_\_\_\_\_

PREVIOUS EMPLOYER: (2) Company Name \_\_\_\_\_ DATE (Month & Year) From \_\_\_\_\_ To \_\_\_\_\_

PREVIOUS JOB TITLE/RESPONSIBILITIES \_\_\_\_\_

STATEMENT OF CAREER GOALS \_\_\_\_\_

HOW SOON COULD YOU START A NEW POSITION? ☐ IMMEDIATELY ☐ 60 DAYS ☐ OTHER \_\_\_\_\_

I CERTIFY THAT THIS SUMMARY REPRESENTS MY PERSONAL EXPERIENCE AND INTEREST

SIGNATURE \_\_\_\_\_ DATE \_\_\_\_\_

Mail your application before May 21, 1984 to Mr. Dale H. Leach, at:

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**PERSONNEL RECRUITERS:**  
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## POSITION ANNOUNCEMENTS

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## If you recognize quality as quickly as the KLA 2020, you're already reaching for your resume.

The KLA Model 2020 automatically completes micro test inspection of a wafer in about 5 seconds, and micro inspection in less than 1 second per field-of-view. That makes the 2020 a revolutionary process control tool for wafer printed VLSI circuits.

Despite its impact, the 2020 is simply the latest in a long line of exciting inspection equipment from KLA. We're the leader in automated image analysis, and listed by *Inc.* magazine as one of the fastest growing companies in the United States. Our employees also have an eye for quality — 80% of our original workers are still with us almost 8 years later. Consider these opportunities to join us.

### Software Engineering Managers

Lead a group of 4-6 software engineers in developing software for our new automatic wafer inspection product. The system includes software for image processing and control based on 68000, our own bit slice and pattern processors, and a microprocessor control system. Requirements include a MS in EECS/math and 6 years of software experience. Experience in Computerized Image processing is preferred. Management experience is not necessary.

### Software Engineers

You'll work on pattern recognition, automatic control, and algorithm development, using PASCAL, "C", microcode or assembly language for a variety of processors including 68000, 2802, 8031. Requirements include a BS in CS/EE/math (MS preferred) and 2-4 years' software development background, high level language and assembler experience. Some hardware knowledge would be useful.

### Applications Engineers

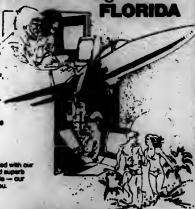
You'll join our new division, formed to develop a modular product line of pattern recognition and image processing systems. Your primary responsibility will be to apply image processing software techniques as well as provide technical support to customers, which involves developing and presenting proposals, performance specifications, cost estimates and schedules. You will also conceptualize, implement and demonstrate prototype designs, write and present technical papers, and support marketing and service documentation development. Requirements include a BS in EECS/Physics, and at least 4 years' experience as a process or manufacturing engineer in the semiconductor industry. You should be an aggressive, self-starting individual with an ability to understand and utilize various opto-mechanical components associated with image illumination and acquisition.

Take a look at KLA, the company with an eye for quality. We offer an excellent salary and incentive package that includes a company profit sharing and stock purchase plan. Please send your resume to KLA Instruments Corporation, Attention: David Brown, 11000000 Gateway Boulevard, Santa Clara, CA 95050. Or call, (408) 986-6100. We are an equal opportunity employer.

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## PROGRAMMER/ PROGRAMMER ANALYSTS

## It's time to migrate to FLORIDA



PRATT & WHITNEY is seeking individuals with a Degree in Computer Science or related area and 2-4 years experience with COBOL, IBM JCL, MVS, TSO, BPF, RAB DSDG on large IBM main frames in the following areas:

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### FACULTY POSITION

Lecturer in MIS position number 304-10 for 1984-85 Academic Year. To teach DBMS, data communications, programming, systems analysis or small business systems. Ph.D. preferred, master's plus experience considered. Resume and letter of application to: Dr. William L. Oult, Jr., Associate Dean, School of Business, University of Northern Colorado, Greeley, CO 80639. Application deadline: April 15, 1984. AMCO Employer.

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### SENIOR PROGRAMMER/ANALYST

Programmer and analyst position has an immediate opening in information systems department in large, growing, progressive organization in the health care industry. Responsibilities include: design, develop and test programs; maintain and modify existing programs; and support of business functions. For consideration, please send resume to: Human Resources Department, 10000 N. 10th Street, Suite 100, Phoenix, AZ 85021. Equal Opportunity Employer.

For consideration, please send resume to: Human Resources Department, 10000 N. 10th Street, Suite 100, Phoenix, AZ 85021. Equal Opportunity Employer.

### DATA BASE

CT, cons. expanding DB dept. Exp. writes modeling, data architecture to file, SAS, or TOTAL. Fr. staff pos. leading to mgmt. To \$40,000.

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HAMMILL PAPER COMPANY, a leading producer of paper and other products, has an immediate opportunity in its Info Corporate Headquarters.

The successful candidate will have 3-5 years systems programming experience in an IBM environment with a thorough knowledge of CICS implementation, internal, product documentation and resolution. Exposure to MVS, JCL, and on-line accounting modules very helpful.

The incumbent would become a member of an expanding technical services department and would be contributing to the planning, installation, maintenance, testing and support of a CICS environment.

We desire MIS environment knowledge of IBM 3081/3091 multi-CPUs, shared DBMS, VM/SPS operation with MVS, CICS, and OS/VS1. In addition, technical services experience Information Center products, i.e., PCOLIS, JSPRS, SRS, etc.

Our up-to-date facilities and equipment offer a stimulating work environment and an opportunity for career growth. If you are a qualified professional seeking a career change for the better and wish to participate in a superb internal mobility environment, you are invited to submit your resume, including salary history and requirements, in strict confidence to: Mr. J. J. Johnson, Director, Manager, Information Systems & Business Development, Hammill Paper Company/P.O. Box 10000, Phoenix, AZ 85021.

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## JOIN US IN VERMONT NORDICA USA, INC.

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**SENIOR PROGRAMMER/ANALYST**

to join our staff at U.S. headquarters in Essex Junction, Vermont. We presently utilize DEC PDP-11 computers running RT-11/TSS operating systems using DBOL/SQL. The ideal candidate will possess 3-5 years experience in analysis and programming in a structured data processing environment using an established systems design methodology and have a record of job success. Experience in Distribution and Financial applications a MUST. B.S. in Computer Science or equivalent experience required. Familiarity with MGBA software packages strongly desired.

Qualified individuals should submit resume, including salary requirements to:

NORDICA USA, INC.  
Attention: John Feschauer, D.P. Manager  
8 Thompson Drive  
Essex Junction, VT 05462  
NO TELEPHONE CALLS, PLEASE

# "Whatever It Takes."

Brian Bluh began working for Cincom Systems in 1977 as a programmer. Initiative and sound thinking have served Brian well. Today he is a Cincom Technical Service Center Manager and an authority on the support and service of leading edge software products. From a recent interview here are Brian's thoughts on support, software and a career with Cincom Systems.

**The Role Of Service And Support:**  
"Bottom line, the role of service and support is to help Cincom's customers become more successful. As our customers become more successful, Cincom becomes more successful."

**Solving Problems**  
"I believe the reason my experience at Cincom has been so fruitful is that my personal philosophy and the philosophy of the company are the same. We both believe in doing whatever it takes to solve a problem or meet a customer's needs. That could mean on-site help. It could mean consulting. It could even mean designing a specialized program. But whatever it takes, we do it."

**A Concept of Partnering:**  
"Cincom's philosophy has been with the company since the word go. No matter how tough the problem, nor where the cause, we're right there in the trenches with our customers. A goal of ours is that no critical problem will be unresolved for as much as 60 minutes. And we hit this goal in over 98% of all instances."

**Leading Edge Technologies**  
"Support people are like anyone else in the computer business: they thrive on challenge and they want to work with the leading technology. TOP®, ULTRA®, MANTIS®, MRPS®, MANAGE USER SERIAL®, PC CONTACT™... these are some of the newest and most advanced systems in the software industry. And these are the products our people are working with everyday. By working with challenging, leading edge products, people develop a strong personal commitment to leadership and to quality."

**Excellence in Software Technology:**  
"To me, excellence in software means having the sense to look beyond the present and into the future.  
Let's face it...

the computer business is changing as fast as any business ever has. Anticipating a customer's needs takes vision. In my opinion, no one else comes close to Cincom's vision. That's why we are producing the truly excellent software technologies in our field."

**People:**  
"I don't know about other software vendors, but at Cincom some of the most talented people in the company work in support. They have to. We deal with Fortune 500 companies who are striving to advance the state-of-the-art. Often we work directly with the top DP person within the company. So, our people have to be of the same top-notch caliber to be effective. Leading edge companies need leading edge people. And, I'd say to any top-notch self-starter who truly knows the business and is a team player, 'Cincom is definitely the place for you.'"

**Advancement:**  
"At Cincom, how fast a person advances depends solely on merit. When people interview for a position in support I want them to know two things: First, that Cincom is a positive, fast-paced place. And secondly, that it is an environment that will allow them to progress as fast as they are able."

**Support, Sales, Marketing and Development:** We're looking for talented self-starters in all of these areas.

For more information on a career with Cincom Systems, send a cover letter and a resume to:  
Marilyn Jacobs,  
2300 Mountain Avenue,  
Cincinnati, Ohio 45211.  
Or, call: 1-800-543-3811.



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# What do CAD/CAM GRAPHICS PASCAL Professional Computers Networking and MDSI Have in Common?

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Houston, TX 77064  
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IDMS  
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System  
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301/736-3002

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PEOPLE/PRODUCTS/RESULTS

## Data Processing

## HOME BANKING VIDEO TEX/ATM

### Programmers Systems Analysts

Geaco is a major computer service and software development company servicing the financial industry. In the past 5 years, we have grown 5 times in size and we project a similar growth over the next 5 years.

Geaco is currently implementing a major EFT system using ACI SOFTWARE to include bill payment, electronic mail, information display and financial transactions. The EFT hardware is a TANDEM based non-stop 10 system with microcomputers being used as the remote access client terminals.

Currently we are seeking SYSTEMS ANALYSTS with a minimum of 3 years experience including large systems feasibility studies and the development of detailed logical and physical system design. Experience in project leadership and utilization of a System Development Methodology highly desirable.

AND we are now seeking PROGRAMMER ANALYSTS with a minimum of 2 years TANDEM experience using TAL, ENSCRIBE and PATHWAY. Additionally, you should have DATA COM experience with SDLC and B5Sync protocols. Experience with ATM large IBM mainframes and project management is a strong plus.

Fresno is just three hours away from the San Francisco Bay area and offers an outstanding educational system, climate and AFFORDABLE housing and relocation. We offer a competitive salary and benefits package.

TO BECOME A MEMBER OF OUR HOME BANKING/VIDEO TEX PROJECT TEAM, immediately contact:

A.J. Newberry

Outside California call: (208) 224-8373  
Inside California call: 1-800-221-3388

**ESCO** corporation

## DATA PROCESSING OPPORTUNITIES

Continued company expansion requires the addition of new professionals to our Data Processing Department. We're looking for people attracted to a dynamic manufacturing environment. Current system is IBM S083-E16.

**MANUFACTURING PROGRAMMER/ANALYST**  
Job #PLC-368

Responsible for analysis, design and programming of company manufacturing systems. Requires 3 years experience in IBM S083-E16 and inventory control applications. Knowledge of VISA, CICS, COBOL or ASCENDANT, DOWRY preferred.

**APPLICATION PROGRAMMER/ANALYST**  
Job #PLC-369

To replace a transfer to our new Computer Services Group, this position is involved with varied applications. Performs analysis, design and programming activities. Requires 2 years field experience with COBOL, CICS, VISA.

Greater what Valmont offers:

**GROWTH**, new challenges, business opportunities ahead. Valmont is a company engaged in industries as diverse as transmission structures to computer systems. Our 1980 sales were \$64M. We're a Fortune 1000 company and we'll be there for years to come. Our central office people must be able to handle and manage highly technical, transmission structure and other projects and manage highly technical, transmission structure and other projects and manage highly technical, transmission structure and other projects.

**COMPETITIVE COMPENSATION**, "comprehensive" base salaries our package which includes employee savings program, insurance (medical, life and dental), retirement, educational reimbursement, internal job list, paid holidays and vacation, tuition assistance, plus relocation assistance. We recognize and reward our employees' contributions through a competitive performance appraisal and salary review program.

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**VARIED APPLICATIONS**, manufacturing, marketing, accounting, finance, human resources, engineering, insurance, to name a few. Opportunity to develop many skills in varied applications.

If you're interested in pursuing a career with a rapidly expanding and diversified company, we invite you to take the next step. Write or submit your resume with salary requirements to: Director, Human Resources, Valmont Industries, Inc.

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NORTHROP ADVANCED SYSTEMS DIVISION...

# THE FUTURISTS

(Southern California)

The futurists of Northrop's Advanced Systems Division in Southern California are seeking true computer skills beyond the present and into the next century of aerospace. If you've got the ability and desire to glimpse the future in your desktop, you can participate with us by the time the latest needs in the aircraft industry within our nearest facility in Palmdale. Explore the opportunities listed below and join the futurists.

## Network Communications

Most individuals with experience in maintenance and installation of computer hardware in a large IBM environment. Assignments involve troubleshooting problem hardware, designing hardware networks, assessment of comprehensive plans for installation of computer hardware and actual installation of various types of standard and graphic devices and interconnectivity for business and scientific applications. Knowledge of APTAC, BPTAC and DPA/DCOL products is expected.

## Capacity Planners

Performance and time systems programmers with experience in JCL configurations job runs with heavy MVS. Familiarity with reporting techniques, graphical representation and SAS, as well as performance experience with Copeston, Gulf and Rulf is required.

## IMS Systems Programmers

Must have thorough knowledge of the IMS installation procedures for program products and other software that relates to IMS. Knowledge of ACB, PCB and complete DB/DCOL products is required. Successful candidates will provide assistance to programming personnel related to procedures and policies of IMS.

## Network Design Specialists

Must be experienced in design and analysis of DB/DCOL, and 3274/CLU's in various configurations using DBA in a large IBM environment running JES 2/VTAM/TCAM. A working knowledge of APTAC, BPTAC and DCOL diagnostic equipment, software on going data testing and hardware testability studies.

## Sr. ILS Systems Analysts (Scientific)

Must be capable of developing information systems requirements as well as estimating and documenting scientific oriented computer applications. Requires experience with a variety of modeling applications such as: maintenance data, maintainability, reliability, availability, cycle cost, etc. Must have 10 or more years recent military aerospace experience in one or more of the above. A BS/MS degree is preferred.

## Data Base Analysts/Designers

Several new positions are presently including Data Base Design, MF and BNF processing support, DB, traditional IMS and newer relational, DB, products, IBM Data Dictionary automation and support, IMS Control Block (CBL), PCB, ACB Generation. Other opportunities include the responsibility of evaluating DB/DCOL related software, develop recommendations for advanced technical programming to upper management, as well as provide assistance to Civil Users, Requirements Planning, Systems and Programming Analysis and other CP sub-elements. Experience in IMS Data Base Administration and/or design with a background in SAS on-line and/or Batch Message Processing required.

## Data Processing Equipment Configuration Specialists

This responsibilities will include equipment installation, acquisition recommendations, configuration design, installation planning, turnover and control and installations, site facilities planning, equipment and facilities inventory tracking.

## Computer Systems Technical Writer

Will develop documentation required for the development and implementation of business and scientific systems and models. Will ensure that all documentation is of high quality, meets commercial/military standards, reflects actual procedures/practices and is completed on schedule. Must have excellent oral and written communication skills. A BS/BA degree preferred. Previous ILS aerospace experience a plus.

## Business Systems Programmers/Analysts

Will analyze and formulate system design solutions by coordinating with analytical and user personnel. IBM hardware must have ILS experience with emphasis in IMS DB/DCOL, COBOL, and other related software, ILS and Mark IV experience a plus.

Responsibilities include designing, coding, testing and preparing interactive business systems. Will work closely with requirements planners and system users. Requires a working knowledge of IMS, DB/DCOL, COBOL, and system design techniques. Experience with Engineering and/or Manufacturing systems, and programming development productivity tools are a plus.

## Systems Analysts

Will assist users of data processing systems and services (i.e. engineering, manufacturing, finance) in establishing and planning for systems requirements and in converting to the use of data processing systems. Will work closely with users in developing alternatives for engineering systems and in identifying potential of computers for meeting problems or meeting objectives as well as perform liaison between user and data processing organization during systems development and evaluation. Will assist in testing of user personnel in system procedures.

Qualified applicants should have analytical and systems design experience (preferably in an aerospace environment) in one or more of the following areas:

### Engineering

- Modeling and simulation, finite element analysis using NASTRAN for avionics and structures.
- On line systems for administration (drawing change control, specifications, structures).
- Computer Aided Design and Drafting (CAD/CAM) for interactive graphics.

### Manufacturing

- Manufacturing Engineering — Manufacturing Engineering applications, tooling, production planning.
- Industrial Engineering — Major instances, computation and data manipulation, MS, STD 1587 & 1528.
- Operations Control — Labor and tracking data collection, shop floor control, inventory management, automated warehouse, capacity planning, scheduling.
- Material — Material control procurement and related accounting.
- Facilities and Transportation — Request tracking, inventory, vehicle dispatch and tracking, equipment maintenance.

### Finance

- Cost Management and Accounting — Payroll, general ledger, budgets and accounts payable.
- Controller — Manufacturing technology as applied to controller, MS, TSO and FORTRAN applications/development.

Selected candidates will receive excellent salaries and a wide variety of benefits. Please send your resume and salary history to:

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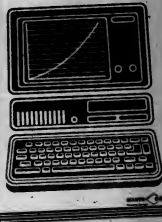
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## Free!

1984 Computer Salary Survey  
and Career Planning Guide

## New 1984 Salary Data

No doubt, during 1983, you knew that many firms took a hard line on awarding salary increases—*at least* in some cases, even enacted across-the-board cuts.

Yet, on the other hand, did you know that salaries for some computer professionals actually *dropped* right on through the uncertain business outlook?

## Computer salaries are up.

The new, 1984 Computer Salary Survey and Career Planning Guide is based on contacts with more than 44,000 computer professionals and 35,000 organizations. Not only are salary averages for fifty-eight positions (including ten new ones), but high and low compensation ranges are also provided.

Included are positions in programming, software, systems design, data base/data communications, file auditing, operations, computer sales, marketing, management support and management.

In addition, the new Survey details seven ways to maximize your chances of getting ahead through a proven, seven-step system that has helped thousands of computer professionals advance their careers.

## Free to computer professionals.

The new 32-page Survey is available to you without charge. Since 1966, this annual report has helped so-

premiately a quarter of a million computer professionals understand current trends in technology and compensation, realize how and where they fit in and what they need to do to reach their full potential.

You owe it to yourself—especially if most of your career has been—*to call or write today.*

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Call the Source EDP office nearest you for a free copy of this new 32-page report. We'll mail a copy to you in strict confidence, without obligation.

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—are in demand  
—are interviewing  
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We are a nationally ranked recruiting company (among the top 10 in our industry). We are recognized by our clients for representing top-quality professionals with experience in large scale IBM installations. (1 yr. exper. minimum) Our client companies retain us (lower cost to you) to provide qualified candidates for their specific job openings. All fees, interview costs and relocation expenses are paid by the company clients.

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We are a leader in a segment of the data communications industry and have grown over 400% in the past five years. Our Connecticut-based, high technology engineering and manufacturing firm is seeking a sales executive experienced with data communications and selling large systems to major accounts.

Candidate should possess a proven track record and be capable of directing and motivating an expanding national sales organization. Planning, budgeting, leadership and organizational capabilities are a must.

This is an outstanding opportunity to join a management team who is maintaining their leadership position through hard work and a commitment to excellence.

If you possess these qualifications, send your resume with earnings history in confidence to:

CW-84589  
Computerworld  
Box 890  
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HCR  
PROGRAMMERS  
Miami Lakes

We're one of South Florida's major data processing service bureaus providing services to large numbers of foreign and Latin Clients.

Due to internal promotional growth, we're seeking experienced Programmers with working knowledge of HCR MALT and COBOL languages.

The successful candidate will possess a minimum of 1 year programming experience in both language and line applications such as COBOL, MALT, Savings, loan tracking, and account ledger systems. A Bachelor's Degree in Computer Science or related field is preferred.

We offer an exceptional compensation and benefit program plus the opportunity to grow professionally and grow with a strong financial corporation.

Please send resume in confidence to Personnel Manager, 6851 S.W. 57th Avenue, Miami, FL 33157.

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Subsidiary of  
FEDERAL FINANCIAL  
SERVICES A LINE SELLING  
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## IDMS

Systems Software  
Development

Natural Data Base Systems is a full-service consulting and software company specializing in providing support for organizations using Cullinet's IDMS systems. Our services include consulting, on-site training programs, and software products for the IDMS DB/DC environment.

We currently have openings in our San Francisco office for system software developers. Qualified candidates will possess an in-depth understanding of IDMS DB/DC internals and good Java/Assembler language skills. Relocation to the San Francisco Bay Area will be required.

Network Data Base Systems offers a five-year benefits package for our employees that includes a stock option plan. For consideration, call or send resume to:

JOSEPH B. DUMARTINO  
NETWORK DATA BASE  
SYSTEMS, INC.  
390 BRIDGE PARKWAY  
REDWOOD CITY, CA 94061  
(415) 362-4810

No agencies please.

NEBS

# You Decide.

If you want opportunity and challenge,  
the choice is Tandem's Software Development Team.

We pioneered the field of fault-tolerant computing. And, with our new TXP™ system, we've taken on-line transaction processing further than anyone had imagined.

As career go, however, what makes Tandem different—and, we believe, better—is that we support the notion that the essence of success in our business is founded in opportunity and challenge for each of us.

## Data Base Management Relational Data Base Management

Requires 3+ years' experience in relational data base management systems development to contribute to a new project, and an understanding of query processing, various data access methods, data description and data manipulation concepts, implementation experience with architectural design and distributed DBMS.

## Application Development Tools

Design/implement high-level application development tools in the areas of application specification and generation, non-procedural language design, human engineering and ergonomics.

## Diagnostic Technical Leader

Design/specify the maintenance and diagnostic architectures, design methodology and diagnostic tools for support of distributed fault-tolerant systems. MISCs/MSEs and previous project management experience desirable.

## Quality Assurance

Software Product Quality Experience in the design/implementation of quality computer systems. Use your analytical and creative abilities to enhance product design, implement test tools and develop regression test libraries in data base management, operating systems, data communications and compilers.

## QA Test Leader

Lead a group building quality into new system software. Write test programs, design a regression test system and develop a robust control library system. Sound knowledge of data base management software, software reliability and operating systems.

## Operating Systems

Position involve mail design, implementation and debugging skills, additional operating systems development experience, and excellent writing and verbal skills.

## Dish Access Method and Transaction Management

High-level design skills. Experience with file systems, access methods, device independent I/O, locking, failure recovery, transaction management.

## Data Communications

Develop and enhance software from link level protocols to access methods. Projects involve LAN, ADCCP, SNA, SDLC, HDLC, X.25 and networking.

## Processor Microcode

Design and develop processor instruction set and I/O channel microcode, participate in microarchitecture definition. Requires 3+ years' experience developing instruction set firmware or related hardware design.

Call Joy Mar COLLECT at (408) 725-5087 for more details about these positions, and about our 6-week paid relocation. Or send your resume to her attention, Tandem Computers Inc., Dept. 3/1, 19733 Velero Parkway, Cupertino, CA 95064. We are an equal opportunity employer.

Principals only please.

# TANDEM



Makers of TXP, the most powerful on-line computer in business today.

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## \$80,000/YR — CICS PROGRAMMING

Anyone who can read and write CICS (Control Language) programming can make a lot of money. We are looking for experienced CICS programmers to work on a full-time basis. The successful candidate will be responsible for writing, testing, and maintaining CICS programs. The position requires a minimum of 5 years of experience in CICS programming. The salary is \$80,000 per year. The position is located in the San Francisco Bay Area. For consideration, please send your resume to: JOSEPH B. DUMARTINO, NETWORK DATA BASE SYSTEMS, INC., 390 BRIDGE PARKWAY, REDWOOD CITY, CA 94061, (415) 362-4810. No agencies please.

## THE CICS PROGRAM

Anyone who can read and write CICS (Control Language) programming can make a lot of money. We are looking for experienced CICS programmers to work on a full-time basis. The successful candidate will be responsible for writing, testing, and maintaining CICS programs. The position requires a minimum of 5 years of experience in CICS programming. The salary is \$80,000 per year. The position is located in the San Francisco Bay Area. For consideration, please send your resume to: JOSEPH B. DUMARTINO, NETWORK DATA BASE SYSTEMS, INC., 390 BRIDGE PARKWAY, REDWOOD CITY, CA 94061, (415) 362-4810. No agencies please.

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## COLORADO OPPORTUNITIES

Come to the High Country



Due to the aggressive plans of our Western Operations, which are located just North of Denver, we are searching for degreed data processing professionals for the following:

### VAX SOFTWARE SYSTEMS ANALYST

2 or more years experience with VAX/VMS background interfacing with VAX 11/730 and 11/750 equipment.

### IBM APPLICATIONS ANALYST

5 or more years experience with CICS and DLI or IMS, IBM 303X operating DOS/VSE.

### SOFTWARE SYSTEMS ANALYST

3 or more years software experience. Strong familiarity with DOS/VSE, VSE libraries, JCL and systems utilities.

### SOFTWARE MANAGERS

10 or more years of experience with VAX 11/750 and IBM 3031/3033 operating with DOS/VSE.

Our Data Processing organization is small enough to encourage active interface with your associates and to allow high visibility for your accomplishments, yet we offer the strong stability of a rapidly growing Fortune 500 company.

Ball Corporation's aggressive manufacturing operations offers strong professional growth potential and the opportunity to work on a variety of challenging projects for our Technical Products and Mass Containers manufacturing groups. We offer excellent pay, benefits and working conditions. For immediate consideration, send your resume and salary history, in confidence, or call Collect.



**Ball Corporation**

J.L. Winslow  
Ball Corporation  
345 S. High Street  
Muncie, IN 47302  
(317) 747-6200

## CICS/VTAM SYSTEMS PROGRAMMERS

Major S.E. corporation headquartered in Atlanta affiliated with Alabama, Georgia, Gulf and Mississippi power companies, has the following positions available:

### CICS SYSTEMS PROGRAMMER

- Experienced with BAL and CICS internal
- Install and maintain CICS
- Performance measurements and tuning
- Knowledge of SMP and problem determination

### VTAM SYSTEMS PROGRAMMER

- Knowledge of data communications protocols
- Knowledge of IBM 2260 and MCP
- Knowledge of VTAM, NCCP, NPD
- Knowledge of SMP
- Problem determination

We offer competitive salaries and excellent benefits package. Please forward resume with salary history, in confidence, to:

Personnel Department

SOUTHERN COMPANY  
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Atlanta, GA 30346

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**Southern Company Services**

the southern electric system



### SM EXPANSION FAST-TRACK SMP PROFESSIONALS

- MANAGERS - staff background
- SE ANALYSTS - project leadership
- SEAL/PMIS - CHIEF, PL, DMS
- SEAL/PMIS - DMS
- PMIS RECORDS
- CAREER PLANNING
- ENTREPRENEUR BENEFITS
- INDUSTRY PORTFOLIO: FORTUNE 500
- MANAGEMENT CONSULTING

C.E. Winkler  
Manager, SM Expansion  
Bentley Systems Co.  
P.O. Box 3000  
Burlington, VT 05402-0000  
(802) 251-0101

### DATA PROCESSING SUPERVISOR

If you've been planning a career move that will put you on a professional team in a fast paced environment where there is a lot of growth, here is a opportunity you've been looking for. We have an immediate career opportunity for a degreed individual with 7 to 10 years experience in a data processing environment. 20. Hourly compensation and strong career advancement is also. We are looking for a degreed person with an understanding of data processing and a strong background in computer systems with salary history.

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## Systems Analyst/Programmer

### Overseas Employment Kwajalein, Marshall Islands

Global Associates, an international base operations and support services company has an immediate need for a Systems Analyst/Programmer.

Will be responsible for maintenance of current software applications primarily in the areas of supply and plant property. Will develop systems and programs as required as well as updating and maintaining existing programs. Interfaces with user departments to determine current and future needs. Other duties include training operations staff and programmers.

Qualified candidates shall have a Computer Science degree or equivalent experience, plus five years of systems analysis/programming. ANSI COBOL experience required. CDC 6400 and Scope 2.4KHS Operating System experience desired but not essential.

Kwajalein offers an opportunity to enjoy sailing, fishing, scuba diving, golf and many other amenities. We offer annual paid vacation with transportation to port-of-call and an opportunity for overseas U.S. Tax Exclusion. Bachelor and/or family housing are provided at no cost. The Kwajalein Schools are fully accredited, K-12. U.S. Citizenship is required.

Interested candidates should forward resume to:

Kathy Ringwood  
Global Associates, Dept. 470,  
P.O. Box 12-94  
Olathe, KS 66064-2154



**Global Associates**

An Equal Opportunity Employer

### MANAGER-COMPUTER CENTER SYSTEMS PROGRAMMER

NOVA UNIVERSITY  
Port Landonville, Florida

Applicants for position of Manager should have the following qualifications in an academic setting:

- Minimum of 3 years supervisory and managerial experience.
- Minimum of 1 year systems programming experience.
- Knowledge of computer systems and management systems.
- Good communication and interpersonal skills.

Applicants for the position of Systems Programmer should have the following qualifications:

- Minimum of 3 years systems programming experience.
- Knowledge of COBOL.
- Knowledge of computer systems and management systems.
- Experience with "C" and UNIX languages.

Salary commensurate with experience and qualifications. Send resume ASAP to:

Nova University  
Systems Programmer  
College Avenue  
Port Landonville, FL 32065  
Attention: Academic Opportunity Employer

### ACADEMIC COMPUTING

Responsibilities for management of VAX 11/750, RDP 11/44 with MVS, interactive terminals, information systems, telecommunications, and other computer services. Minimum: Master's degree or equivalent and 3 years experience in academic computing. Salary: \$37,000-\$40,000. Send resume and 3 references postmarked by April 15, 1984 to:

Dr. Janet Hines  
Provost's Office  
Northwestern Illinois University  
6000 North St. Louis Avenue  
Chicago, IL 60630  
AE002

### COBOL PROGRAMMER

2 to 5 years COBOL experience in a VOS environment. Other basic experience a definite plus. Enjoy a stable position with a growing shop in a comfortable university town. Salary negotiable. Send resume and salary history to:

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Employment Relations  
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Expertise?

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Mr. Neil J. Overman  
Director, Information Services  
in confidence to:  
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Vienna, VA 22180  
(703) 556-8800

## UNIX/C

\$25,000 to \$60,000  
APPLICATIONS & SYSTEMS  
Over 300 Openings Nationwide  
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123 Franklin Center Rd.-Dept C-0  
Lawrenceville, GA 30046  
(404) 962-1000 or (404) 962-1001

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#### PORTION ASSIGNMENTS

### POSTION ASSIGNMENTS

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**Pacific Northwest  
Telecommunications  
Analyst/  
Programmer**

### Section 1

Woods' death, a major breakthrough had been made. The coroner's jury ruled for a homicide verdict, although it is a little known fact that the coroner, James J. McGuire, died in 1905, and one of the jurors, Percy Williams, was himself an expert on the fact that the coroner's jury should be a jury of 12, not 10, as was the case in 1905.

The responsibilities of this individual include the development of new software for a wide range of communications and network equipment, the installation of telecommunications test systems, on-site support of the installed system team, and remote monitoring.

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WESTIN

**INSURANCE  
DATA PROCESSING  
PROFESSIONALS  
CONSULTANTS**

The Life Insurance Company of Virginia has attractive openings for individuals who are eager to keep pace with the fast growing opportunities in insurance applications.

LOV's reputation as a leading provider of information on the U.S. economy and its markets is well known. The company's research and analysis is widely cited by the media, government, and industry. LOV's research is also used by many of the world's leading financial institutions, including the Federal Reserve Bank of New York, the U.S. Treasury, and the U.S. Department of Commerce. LOV's research is also used by many of the world's leading financial institutions, including the Federal Reserve Bank of New York, the U.S. Treasury, and the U.S. Department of Commerce. LOV's research is also used by many of the world's leading financial institutions, including the Federal Reserve Bank of New York, the U.S. Treasury, and the U.S. Department of Commerce.

We are proud of our commitment and to the people of the world. We are proud of our commitment to the people of the world. We are proud of our commitment to the people of the world.

If you are interested in significant challenges, forward your written resume, with current salary, to Richard P. Johnson, Senior Personnel Administrator, Life Insurance Company of Virginia, 5010 West Broad Street, Richmond, Virginia 23226. Principals only please.

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Insurance  
Energy

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## DATA PROCESSING

We are searching for experienced, enthusiastic individuals who wish to contribute to an active, progressive data processing team. If you are self-motivated, career-oriented, and possess the following qualifications, we would like to hear from you.

## SYSTEM PROGRAMMER

Applicants should have 2-3 years experience in Systems Programming and degree in Computer Science. Will have primary responsibility for the implementation, table generation, table maintenance, and testing of multiple IBM CICS/VS data communications environments. Must have knowledge of VM/SP and DOS/VSE operating systems. Hardware environment consists of 4341-1 and 4361-2. Excellent benefits and salary. Send resume and salary history to:

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**AND TELEPHONE ROOMS, PLEASED**

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Tobacco Co.**

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**MANAGER  
TECHNICAL SERVICES  
MILWAUKEE  
PUBLIC SCHOOLS**

**Father:** The Milwaukee Public Schools has an approved alternative action plan established for this position. Qualified minorities, women and handicapped individuals are encouraged to apply.

The Manager of Technical Services is responsible for planning, supervising and directing the activities of Systems Programming, Computer Operations and Office Services Sections of the Milwaukee Public Schools Information Systems. Possesses a Bachelor's degree in Computer Science, Business Administration or Engineering and a years experience in data processing. One year of which must have been in a supervisory capacity. Salary range \$1-40K, plus benefits, travel, paid vacation and for confidential information.

**Timothy J. Van Buren**  
 (714) 270-2071  
 San Jose, Calif. 95128

**CITY HALL**  
200 W. Wells St.  
Milwaukee, WI 53202

*An Alternative Action Network*

## Programmer/ Analyst

**PL/1, DL/1, CICS Proficiency**

Major division of the A.C. Nielsen Company, located along the foothills of Colorado, is seeking an individual with demonstrated competence in PL/1, DL/1 and command level CICS for major development projects.

If you meet the criteria and wish to expand your technical skills, we will interview you at our expense. We offer a marvelous location and challenging work in a technically exciting environment: 2644 SOMER, MPV/CA, 948, over 50 GIGA bytes of on-line storage and international data communication network.

Qualified applicants please forward resume or personal letter with salary requirements to:

### History Channel

**Nielsen**  **Neodata**

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Boulder, Colorado 80500  
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## PROJECT LEADER

Project Management in  
Scientific Systems/Data Communications

The Scientific Systems Division, as a part of SOHIO's Cleveland Data Center, functions in a total demand environment, providing solutions to the scientific user community for scientific, engineering and mathematical problems.

We're offering a unique opportunity to lead exciting projects in the innovative use of leading edge technology. For example, we are now designing a HYPERCHANNEL communications network which provides intelligent data transfer between VAX and PDP-11E minicomputers, Control Data mainframe, CRAY and Control Data super computers.

The experienced professional we seek must be thoroughly knowledgeable in the scientific computing environment. You should have an MS in Computer Science, Physical Science or Engineering. We also prefer that your background includes planning communications configurations for Control Data computing systems, familiarity with Cyber 200 machines, and strong leadership capabilities.

You will lead a project task force of highly qualified technical professionals, with primary responsibility for developing requirements, selecting vendors, planning and implementing solutions to user needs.

This high visibility position offers opportunities for close working relationships with systems and user management and potential for career advancement. SOHIO offers a highly competitive salary reflecting your individual experience, an excellent benefits package, and a working environment suited to personal and professional growth. Our comprehensive relocation package for those who relocate all normal moving expenses. Homeowners also qualify for mortgage interest differential allowance, third party home purchase and other features typically restricted to Internal transfers.

Take the first step in joining one of the nation's most successful business entities by sending your resume detailing your education, experience and abilities in strictest confidence to:

Ms. Jean Hefflich, Senior Executive Recruiter  
THE STANDARD OIL COMPANY (Ohio)  
124 Midland Building - 6230W • Cleveland, Ohio 44115  
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**SOHIO**

PROGRAMMER/ANALYST  
SYSTEM/38

Fast growing company in rural country setting needs experienced programmer/analyst for development of manufacturing & retail distribution systems. The successful candidate will have 1 or more years hands on System/38 and 5 or more years Data Processing application development experience. Principles only please.

Please send resume, and salary requirements to:  
MIS Director

**RENOVATOR'S  
SUPPLY, INC.**  
MILLERS FALLS, MA 01349



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Consider a career with the most  
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COMPAQ Computer Corporation broke away from the pack with its portable COMPAQ computer and made business history. Then came COMPAQ PLUS™. Now you have an opportunity to join this front-running company and share the excitement.

The challenge couldn't be more stimulating. You'll have all the encouragement, independence and resources you need to develop your ideas.

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Positions involve the design, development, and testing of personal computer software. Typical software projects include hardware-software interfaces, operating systems, hardware diagnostics, and applications software. Candidates must have a BSEE or BSCS degree with 2 or more years experience programming and at least 2 years of these working with personal computer software. Experience in "C" and 8086 Assembly Language preferred.

Software  
Specialists

Positions involve the design and development of structured software tests aimed at improving the reliability of personal computer systems and applications software. Candidates must have a

BSEE or BSCS degree with 5 or more years experience programming and at least 2 years of these working with software quality assurance and/or software testing. Experience in "C" and 8086 Assembly Language preferred.

Software Business  
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Challenging positions involve working with leading software and hardware companies in the personal computer industry to provide technical support and to maintain business relationships. Candidates must have a bachelors degree and at least 2 or more years experience with personal computer software support of software support.

COMPAQ Computer Corporation offers an excellent salary and benefits package with stock options available to all employees.

If you are looking for a challenging position with a rapidly growing personal computer manufacturer, and you meet the above requirements, submit a summary of earnings and professional history in confidence to:

Robert W. Harper  
COMPAQ Computer Corporation  
Dept. CW336  
20333 FM 1740  
Houston, TX 77070

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**COMPAQ**

COMPUTER CORPORATION

S/38 MANAGER  
NORTH MINNESOTA

Inventory leading firm in great buying area seeks senior data processing manager to direct activities of growing firm. Training of processor and staff responsibilities. Strong design background required. Job #995. PEP 940.

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2638 18th Center  
Minneapolis, MN 55402  
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New England has nothing, nothing, nothing, a Center and two branches, and a position available in PDP, VAX, and IBM. We're a small, but growing company in the data processing field. Send us your resume or call, and let us tell you more about New England.

Our list of client companies is endless, and all fees, interviews and relocation expenses are paid by our clients.

## DATA LINK

Michael Manning Corporation  
Enter Professional Building  
Hampden Road, Center City 02108  
(617) 773-5495

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## Software Systems Engineers Software Development Engineers

If you want to build a new software division capable of providing total life cycle support...

## Harris Can Make It Happen

If you want an aggressive entrepreneurial setting—then the Software Operation of Harris Government Information Systems Division could be the place for you. We are developing and using state-of-the-art methodologies, and have the opportunities for you to achieve the recognition you deserve. Positions are available in our Pacific, Colorado Springs, and Washington D.C./Baltimore facilities. Requirements: BS in CS, EE or related technical disciplines, MS or PhD desirable. Experience in the government contracting environment helpful.

### SOFTWARE SYSTEMS ENGINEERS

System level design experience desired in some of the following: C/I Systems, Large Scale Databases, Local and Wide-Area Networks, Real-Time Data Acquisition, Interactive Graphics, Modeling and Simulation, Man-Machine Interface, Advanced Software Methodologies and Software Tool Development. Experience desired with Requirements Analysis Languages, Subsystem Definition, Proposal Preparation and Software Coding Models.

### SOFTWARE DEVELOPMENT ENGINEERS

Experience sought in the design and implementation of software using structured languages (and programming techniques) including PASCAL, C, ADA, FORTRAN 77 with DEC, DAX, GENERAL, or HARRIS 800/800 Systems. Exposure to modern design methodology (such as POLS) and structured development (from concept/structured walkthroughs of medium to large scale software systems desired).

We are part of the Fortune 300 Harris Corporation, Philadelphia based industrial employer. We offer an excellent compensation and benefits package, a formal merit review program, and outstanding advancement opportunities.

If you feel that your present position doesn't offer the kind of challenge and recognition you really want, call Julian D. Kaufmann, COLLECT, Monday thru Friday, 9 am-4 pm, EST at (202) 678-6467, for more information. Or send a resume to his attention at Harris GISO—Software Operations, Dept. CW, 1000 Wisconsin Road, Melbourne, Florida 32901-1132. For further information after business hours, call 1-800-327-6652.

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SBI MAY BE REQUIRED  
An equal opportunity employer M/F/H/V



**HARRIS**  
OF ITS HAPPENING IN ELECTRONICS,  
ITS HAPPENING IN BUSINESS.

### ADMINISTRATIVE SYSTEMS COORDINATOR Portland State University

Portland State University is seeking individuals and applicants for the position of Administrative Systems Coordinator. The position is located in the Department of University Administration, Information Systems, including the Student Information Systems, reporting to the Vice President for University Administration. The position is responsible for the coordination of administrative systems, including the Student Information Systems, reporting to the Vice President for University Administration. The position is responsible for the coordination of administrative systems, including the Student Information Systems, reporting to the Vice President for University Administration. The position is responsible for the coordination of administrative systems, including the Student Information Systems, reporting to the Vice President for University Administration.

Interested persons should submit resumes and applications to the position of Administrative Systems Coordinator, Department of University Administration, Information Systems, including the Student Information Systems, reporting to the Vice President for University Administration, Portland State University, Portland, OR 97207.

Portland State University is an Equal Opportunity Affirmative Action Employer. Qualified minorities, women and handicapped persons are encouraged to apply.

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10 of 20 Resumes sent up in someone's wastebasket, 8 of you sent your resume to be the 10 to 20 that gets thrown away, and 10 of you are the "lucky" ones to be the 10 to 20 that gets thrown away. To receive a FREE COPY, check one of the boxes and send your resume to: THE RESUME SYNDROME, P.O. Box 100, N.Y.C. 10001.

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Join a growing team within an international financial company. Career oriented individuals, must possess background from DO/AVE/Enterprise, Intel/ISA, Assembly language & 1-yr OCS experience. \$18,000-\$22,000. FEE PAID

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### PROGRAMMER/ANALYST

Are you a Programmer/Analyst with skills in C, Pascal, and Fortran? Do you have experience in the design and development of software systems? If so, we have a position for you.

Annual Salary: \$18,000 to \$24,000. Experience: 2 to 5 years. Education: BS in Computer Science or related field. Location: New York, NY. Contact: [Name], [Address], [City], [State], [Zip].

**ARMOUR HANDCRAFTS**  
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Equal Opportunity Employer

### MANAGER OF HOSPITAL COMPUTING

The University of Nebraska Medical Center is seeking a Manager of Hospital Computing. The position is responsible for the management of the hospital's computing resources, including the design and development of software systems, the management of hardware resources, and the coordination of the hospital's computing activities.

**University of Nebraska Medical Center**  
Dept. of Hospital Computing  
600 S. 24th Street  
Omaha, NE 68105  
Equal Opportunity Employer M/F/H/V

### TECH SUPPORT SUPERV.

South West, Inc. is seeking a Tech Support Supervisor. The position is responsible for the management of the company's technical support staff, including the coordination of the support staff's activities, the management of the support staff's resources, and the coordination of the support staff's training.

**ROBERT SMITH**  
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Parsippany, NJ 07054  
(609) 374-0700  
Permanent Consultants

### DP POSITIONS SEATTLE/PORTLAND

SAH, Inc. is seeking DP positions in Seattle and Portland. The positions are responsible for the management of the company's data processing activities, including the design and development of software systems, the management of hardware resources, and the coordination of the company's data processing activities.

### TEACHING POSITION DOANE COLLEGE

A strong, midwestern liberal arts college seeks a committed teacher for a developing computer science curriculum. Masters minimum with appropriate experience, plus strong interest in teaching and research. Attractive salary. Proximity to Lincoln and the state university. April 20 closing date. Contact: Don Ziegler, Dean, Doane College, Crete, NE 68333.

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Genesys Software Systems Inc. has excellent opportunities for you to expand your software sales career. We are an established, successful and rapidly growing leader in Human Resource Management Systems. We have several positions open within our sales department due to our expanding plans for 1984. We are looking for selling Regional Managers who have at least 3 years experience managing and selling in a software environment. In addition, we would like to hire Sales Representatives with at least 2 years sales experience. Applicants for both positions should possess experience selling in a software environment and have a minimum of 1 year of sales experience. The ideal candidate will have at least 1 year of sales experience and will be available for extensive travel.

As part of our expanding marketing support, we have an opening for an Assistant Seminar Coordinator to help conduct our seminars. This position will be based from our Chicago or Los Angeles offices. This person should possess experience in giving on-line product demonstrations to Fortune 100 executives. The ideal candidate will have at least 1 year of sales experience and will be available for extensive travel.

Our product is a state-of-the-art on-line Human Resource System encompassing Payroll, Personnel and Benefits packages. If you are interested in a career with unlimited earnings potential, as well as selling the best product on the market, then call Harriet Sapiro, Vice President of Sales at 817-686-6400. Your opportunity to join a sales team and be part of a company that supports your growth is a unique opportunity. We are looking for individuals who are motivated and self-motivated. We are looking for individuals who are motivated and self-motivated. We are looking for individuals who are motivated and self-motivated.



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## mfs professionals

FMC Corporation Ordinance Division has long been the world's leading manufacturer of military housed vehicles. The Information Resources group is expanding and wishes to invite talented information systems professionals who are ready to advance their careers, to join our staff.

### sr. systems analysts & systems analysts IBM 3081

Position requires experience in IBM 3081, MVS, IMS environment, 3-10 years' data processing and 1 year COBOL programming background, and large real-time data base management systems knowledge.

### sr. programmer analysts & programmer analysts IBM 3081

Positions require experience in IBM 3081, MVS, with 3-10 years' COBOL programming background in IBM environment, and knowledge of RPO, SP, OF, JCL and utilities.

### sr. data base analyst IBM

Position requires 3-4 years of IBM DBA experience with a minimum of 2 years' prior experience in an IBM COBOL environment. Should be experienced in: full logical and physical database design, performance tuning, and monitoring of IBM applications systems, and all phases of DB applications development.

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The qualified candidates will have knowledge of, and "hands-on" experience in, network specification, design and analysis between CAOS, VAX and PDP 11. You must be able to provide integration for CAD, CAD, CAD and CMI. Responsibilities will include planning, monitoring and executing defined areas of Technical Computing. BSME, BSEE, BECS or related degree required; MBA desirable.

FMC offers an excellent salary and a comprehensive benefits package. For immediate consideration, please send your resume to FMC Corporation Ordinance Division, 1187 Coleman Avenue, Box 1381, Dept. 03-3-37, San Jose, CA 95118, Attn: Jerry Olson. We are an equal opportunity employer. U.S. citizenship or permanent residency is required.

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This is a key position, with responsibilities for worldwide product support. You will also be responsible for identifying, designing, and implementing enhancement that keeps our product at the leading edge of large system technology. Your contributions will be highly visible in our small company, high growth environment.

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## Marketing Communications... Key To Our Business Success

### We Make Information Work

General Electric Information Services Company provides software solutions that are the heart of today's information services industry. We maintain the world's largest commercially available teleprocessing network and are pioneers in the integration of applications software, data processing and communications technology. The GE Marketing Communications experts significantly contribute to the success of our business.

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A highly visible position with complete responsibility for the planning, development, implementation and budgeting of product marketing communications programs that reflect business objectives and marketing strategies. Direct the activities of a staff of communications specialists to establish a balanced program that uses an integrated mix of communication elements and manage the use of outside suppliers. You should have a minimum of 8 years of progressive experience in a key communications role with responsibility for promoting high technology products, including program management and budget preparation and control experience; a sound background in the selection and management of external sources, solid writing and presentation skills. Advanced degree in communications or marketing preferred.

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Will be responsible for overall marketing communications planning and implementation for several of our major products. This will involve planning, strategizing, and the effective utilization of advertising and sales promotion, collateral materials, audio-visual media and trade shows, with full budget responsibility. Your background should include 3-5 years' sales promotion experience in data processing or a related technical industry. Good writing skills and demonstrated experience working with advertising agencies, design studios and other outside suppliers is preferred.

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Coordinate and implement GE Information Services trade and business press relations activities. As a significant contributor to our marketing communications business, you will plan and implement press relation projects, interface with all levels of company personnel in development of press relations material, and represent our business in the implementation of those projects. The successful candidate should have 7 or more years' experience in writing and editing press releases and feature articles, demonstrated success in working with the data processing media and general business press, and the development and implementation of media relations plans and projects in a high technology industry. Experience with special events planning and management and audio-visual techniques is a strong plus.

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Our strong marketing communications program supports the major role we play in business information solutions. If you are interested in learning more about the rewards of being a GE Information Services employee, send your resume and salary requirements to: Professional Recruiting (M-8502), General Electric Information Services Company, 681 North Washington Street, Rockville, Maryland 20850.



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We are looking for a uniquely qualified individual to technically and administratively manage our Personal Computer Systems Software Development Group. In this capacity, you will supervise and direct a group of 8 to 15 engineers involved with developing and porting various operating systems to our personal computer. This will include overseeing graphics, utilities and driver routine development. You must possess extensive experience with and knowledge of PC systems, as well as a familiarity with 8028 and 286 microprocessors, UNIX, and various other operating systems such as MS-DOS and CP/M-86. Technical project leader or supervisory experience and good interpersonal and communications skills are also required. An MS degree in Computer Science is preferred.

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San Francisco Bay Area

Our client, a leading international firm, has a position open for a highly motivated and experienced professional to manage a team of software engineers. The position involves the design, development, and testing of software systems using HP 3000, MPE, and other HP products. The candidate must have a minimum of 5 years of experience in software development and testing on the HP 3000 platform.

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Personnel Services  
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We now have an immediate opening in:

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Dataserv will soon have additional opportunities for field engineers and technical specialists in several other major cities throughout the United States. If you are considering a change in employment, contact Dataserv for a review of what we have to offer.

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# dataserv

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More computer people read Computerworld than any other newspaper in the United States - more than half a million computer people every week. And, among our 529,650 readers at user organizations, about half claim to look at recruitment ads at least every other week (only a small percentage say they never look at recruitment ads). No wonder Computerworld carries more recruitment ads for computer people than any other publication. To place your ad or to get a rate card with complete details on Computerworld Classifieds, call or write:

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# COMPUTER POWER GROUP PTY LTD

## CONTRACTS IN AUSTRALIA - MODEL 204 DBMS -

Computer Power Group, agent for the Model 204 Data Base Management System, is looking for a range of computing professionals for one year assignments in Australia. Essential qualifications are that the candidates should have at least 12 months experience in the use of M204 and that they are available to commence work in Australia within the next 3-6 months.

The jobs are with Australia's Federal Department of Social Security which has recently ordered 7 large Amshel mainframes and more than 400 Wang VS processors. This equipment will support a state-of-the-art system making innovative use of Model 204.

The assignments are in Canberra which is Australia's national Capital, a modern city of 250,000 people. Living conditions are attractive. Canberra is only 2 hours by car from mountains which provide good trout fishing in the summer and skiing in the winter. Canberra is also only 2 hours by car from Australia's east coast and the Pacific Ocean.

Remuneration for the assignments ranges from \$430,000 to \$450,000, depending on skills and experience, which compares with the national average income of about \$17,000.

Our need is urgent and one of our consultants will be conducting interviews in the U.S. at the end of March, beginning of April.

If you are interested in one of these assignments please call our U.S. office on 214-556-2300.

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**FIRMWARE ENGINEERS** with 2-5 years' direct firmware experience for disc controllers. Microprocessor experience required; assembler preferred. BSCS/BSEE.

**SOFTWARE DEVELOPMENT ENGINEERS** with 5-7 years' microprocessor experience with operating systems, networks, data communications, languages and file-server applications. BSCS/BSEE.

If you are interested and qualified, call **TOLL FREE** to schedule your interview:

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Or, send your resume immediately to: **BILL BAUMANN,**



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Qualifications: Graduate of a college or university with a degree in Computer Science or related field. Experience in the design and development of microprocessors. Experience in the design and development of microprocessors. Experience in the design and development of microprocessors.

Interested individuals should send their resumes to: Bill Baumann, ISC Systems Corporation, P.O. Box 214 04, Spokane, WA 99208.

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# SOFTWARE ENGINEERS

UNIX\*, C, PDP-11, M88000

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Computer Consoles, Inc. designs, develops, manufactures, markets, and services a variety of microcomputer-based back-office information systems. Headquartered in Rochester, New York, we have all the cultural and educational advantages of a large metropolitan area as well as the tranquility and scenic beauty of a small, retired town. Our new Office Systems Group is located in lovely northern Virginia Fairfax County just minutes away from our nation's capital.

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You'll be responsible for the design and implementation of data base applications and utilities, or full-blown operating system development including development of a multiprocessor UNIX-compatible transaction processing system.

We prefer a technical degree plus a minimum of 2 years' experience. Knowledge of C, UNIX, and data structures plus experience with data bases in a microcomputer Real Time or on-line environment and/or OS internals are also desired. U.S. citizenship or permanent residence is a must.

\*UNIX is a trademark of Bell Labs.

We offer opportunities for growth plus attractive compensation and benefits including relocation.

For immediate confidential consideration, please forward your resume including salary history to the location of interest to you



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The individual will work closely with the systems analyst and the user to ensure that the program meets the user's needs.

The successful candidate will have a strong background in IBM mainframe systems and a minimum of 3 years experience in IBM, COBOL, CICS, and JCL.

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We offer competitive starting salaries and excellent company benefits that include paid life and health insurance plans, educational assistance, stock plan, retirement, etc. Please forward your resume, including salary requirements, to Professional Employment, Fairchild Industries, Mailstop A-34, 3200 Century Blvd., Germantown, MD 20874-1181, Dept. CW-15.



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## DATABASE ANALYST

Tesoro Petroleum Corporation is a multi-billion dollar integrated natural resources company engaged in various segments of the energy industry including refining; marketing and transportation of crude oil supplies; leasing of oilfield service equipment; contract drilling of oil and gas wells; exploration, development and production of crude oil and natural gas.

We are currently seeking a Database Analyst, for our Management Information Systems Department headquartered in San Antonio, Texas.

The position has been created by the company's recent commitment to using ADABAS, NATURAL, COM-PILE, and CICS in a large IBM main frame environment. Responsibilities will include maintaining the availability and integrity of the ADABAS data bases. Other responsibilities will be to enable TESORO to realize the full benefits of using a 4th generation language and data base technology.

A BS or BA degree, preferably in Computer Science or Business, is required plus a minimum of 3 years relevant data processing/database design experience. Excellent communication skills, experience with database design methodology is necessary. Knowledge of ADABAS Internals and NATURAL programming is required with knowledge of COM-PILE helpful.

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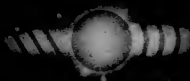
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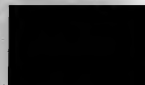
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CLOSED PRICE: MARCH 28, 1984

AS PREVIOUSLY REPORTED

COMPARED AND ADJUSTED BY

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